**Bobby Jindal**
GOVERNOR

**Peggy M. Hatch**
SECRETARY

# State of Louisiana

## DEPARTMENT OF ENVIRONMENTAL QUALITY
## OFFICE OF THE SECRETARY

June 17, 2015

Mr. Ron Curry
Regional Administrator
EPA Region VI/6RA
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

RE: Draft 2008 Baton Rouge Nonattainment Area 8-hour Ozone National Ambient Air Quality Standard Redesignation Request and Maintenance Plan

Dear Mr. Curry:

The Louisiana Department of Environmental Quality hereby submits the enclosed draft for the 2008 8-Hour Ozone National Ambient Air Quality Standard Redesignation Request and Maintenance Plan for the Baton Rouge Nonattainment Area.

A public hearing on the SIP revision will be held at 1:30 pm on July 29, 2015 in the Galvez Building, Oliver Pollock Room C-111, located at 602 North Fifth Street in Baton Rouge, Louisiana 70802. The comment period ends on July 31, 2015.

Written comments on the draft SIP should be directed to:

Cheryl S. Nolan
Administrator, Air Permits Division
P.O. Box 4313
Baton Rouge, Louisiana 70821-4313

Should you have any questions, please contact Vivian H. Aucoin of the Air Permits Division at (225) 219-3482 or at vivian.aucoin@la.gov.

Sincerely,

Peggy M. Hatch

Peggy M. Hatch
Secretary

Enclosure

PMH:APP

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# TABLE OF CONTENTS

EXECUTIVE SUMMARY ........ 1

SECTION 1: GENERAL INFORMATION ........ 2

1.1 Purpose ........ 2
1.2 Area Description ........ 2
1.3 Ozone Background ........ 4

1.3.1 1-Hour Ozone in the Baton Rouge Area ........ 4
1.3.2 8-Hour Ozone in the BRNA ........ 5

1.3 Legal Authority ........ 5
1.4 Public Notice ........ 6

SECTION 2: REDESIGNATION REQUIREMENTS ........ 7

2.1 Attainment of the Standard ........ 7
2.2 SIP Approvability ........ 10
2.3 Permanent and Enforceable Emissions Reductions ........ 10
2.4 Requirements met for the area under Section 110 and Part D ........ 13

2.4.1 Section 110 Requirements ........ 13
2.4.2 Part D Requirements ........ 14

2.5 Section 175A Requirements for Maintenance Plans ........ 14

SECTION 3: EMISSIONS INVENTORY ........ 16

3.1 Overview ........ 16
3.2 Point Sources ........ 16
3.3 Nonpoint Sources ........ 17
3.4 Onroad Mobile Sources ........ 17
3.5 Nonroad Mobile Sources ........ 18

SECTION 4: ATTAINMENT INVENTORY ........ 19

4.1 Inventory Description ........ 19
4.2 Projected Emissions Inventory ........ 19
4.3 Emissions Inventory Summary ........ 20

SECTION 5: MAINTENANCE DEMONSTRATION ........ 22

5.1 Demonstration Requirement ........ 22
5.2 Plan to Maintain Air Quality ........ 22

SECTION 6: AMBIENT AIR QUALITY MONITORING ........ 23

6.1 Attainment of the 8-Hour Ozone Standard ........ 23

SECTION 7: VERIFICATION OF CONTINUED ATTAINMENT ........ 24

SECTION 8: CONTINGENCY PLAN ........ 25

8.1 Contingency Implementation ........ 25
8.2 Contingency Measures ........ 25

Appendix A: Legal Authority ........................................ 27

Appendix B: Public Notice ........................................ 29

Appendix C: 2008 ozone Infrastructure SIP ........................................ 31

Appendix D: Clean Data Determination Request, Proposal, and Approval ........................................ 48

Clean Data Determination Request ........................................ 48
Proposed: Approval and Promulgation of Air Quality Implementation Plans; Louisiana; Clean Data Determination for the Baton Rouge Area for the 2008 Ozone National Ambient Air Quality Standard (79 FR 21178) ........................................ 55
Direct Final Rule: Approval and Promulgation of Air Quality Implementation Plans; Louisiana; Clean Data Determination for the Baton Rouge Area for the 2008 Ozone National Ambient Air Quality Standard (79 FR 21139) ........................................ 58

Appendix E: Technical Support Document - Photochemical Modeling for the Louisiana 8-Hour Ozone State Implementation Plan ........................................ 63

Appendix F: Technical Support Document - Future Year Emission Inventory Projections for the Baton Rouge 5-Parish Ozone Nonattainment Area ........................................ 225

Appendix G: Point Sources Submitting EIs ........................................ 256

Appendix H: Rules and Applicability Charts ........................................ 262

SIP Associated State Rules ........................................ 262

Chapter 21. Control of Emission of Organic Compounds ........................................ 262
Chapter 22. Control of Emissions of Nitrogen Oxides (NOx) ........................................ 262

Applicability Charts ........................................ 263

# EXECUTIVE SUMMARY

The Louisiana Department of Environmental Quality (Department) is submitting a formal request for redesignation to attainment for the 2008 8-hour Ozone National Ambient Air Quality Standard (NAAQS) and a maintenance plan for the 5-parish Baton Rouge Nonattainment Area (BRNA). This request is based on the monitoring data for the BRNA that shows a design value of 0.075 ppm or 75 ppb as of December 31, 2013. The Department attributes the realized reductions and air quality improvements to permanent and enforceable control measures.

Section 107(d)(3)(E) of the 1990 Clean Air Act Amendments (CAAA) states that an area can be redesignated to attainment if all the following conditions are met:

- The EPA has determined that the NAAQS have been attained.
- The applicable implementation plan has been fully approved by the EPA under Section 110(k).
- The EPA has determined that the improvement in air quality is due to permanent and enforceable reduction in emissions.
- The state has met all applicable requirements for the area under Section 110 and Part D.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

The Department provides the necessary information in the following pages to show that all of the applicable requirements have been met. Included in this submission is also an approvable maintenance plan for the BRNA. The Department believes that these are the elements that have made attainment of the NAAQS possible. This revision includes a commitment to submit a second 10-year maintenance plan in eight years as required. The provided maintenance plan includes the following elements:

- Attainment Inventory;
- Maintenance Demonstration;
- Verification of Continued Attainment;
- Monitoring Network; and
- Contingency Plan.

# SECTION 1: GENERAL INFORMATION

## 1.1 PURPOSE

The Department is seeking redesignation of the BRNA to attainment for the 8-hour Ozone NAAQS under Section 107(d)(3)(E) of the CAAA, which states that the Environmental Protection Agency (EPA) can redesignate an area to attainment if all of the following conditions are met.

- The EPA has determined that the NAAQS have been attained.
- The applicable implementation plan has been fully approved by the EPA under Section 110(k).
- The EPA has determined that the improvement in air quality is due to permanent and enforceable reduction in emissions.
- The state has met all applicable requirements for the area under Section 110 and Part D.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

The purpose of this SIP revision is to address all of these requirements, including the submittal of an 8-hour ozone maintenance plan that will fulfill the requirements under Section 175(A) of the CAAA and ensure that the BRNA continues to maintain attainment of the 2008 8-hour Ozone NAAQS through the horizon year 2027. This revision includes a commitment to submit a second 10-year maintenance plan in eight years as required. All outstanding one-hour and eight-hour SIP elements are being submitted under a separate SIP revision.

## 1.2 AREA DESCRIPTION

The BRNA is comprised of five parishes that make up the historical metropolitan statistical area (MSA): Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge. The parishes encompass 2204.54 square miles of land located in the southeastern part of Louisiana. The area straddles the Mississippi River and includes corridors for Interstates 10, 12 and 110, *see Figure 1.1*. The United States Census Bureau estimates the combined population of the five parishes in the BRNA at 757,234[1] people for 2014. Both Ascension and West Baton Rouge Parishes are two of the fastest growing parishes in the state.

The BRNA is diverse in its industrial makeup. According to the American Chemical Society, 16 of the top 50 U.S. chemical firms in the United States[2] and 9 of the top 40 foreign owned firms[3] operate in the five parish area. East Baton Rouge Parish is home to the fourth largest refinery in

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[1]United States Census Bureau: "Annual Estimates of the Resident Population: April1, 2010 to July 1, 2014." March 2015.
[2]Chemical & Engineering News: "Top 50 U.S. Chemical Producers." May 19, 2014.
[3]Chemical & Engineering News: "Global Top 50." July 28, 2014.

the country and at 561,500 barrels of distillation capacity per day, the BRNA represents 3.13% of the nation's total refining capacity.[4]

**FIGURE 1.1: STATE MAP ILLUSTRATING THE BATON ROUGE OZONE NONATTAINMENT AREA**


Ascension Parish is comprised of 291.6 square miles. The 2014 estimated population of Ascension Parish was 117,029.[1]

East Baton Rouge Parish is comprised of 455.7 square miles[1] and is where the state capitol, Baton Rouge, is located. Baton Rouge is the dominant center of business, culture, and finance within the area. East Baton Rouge Parish is the site of the Port of Baton Rouge; diversified industrial plants; over 150 industries including machine shops, foundries, steel fabrications, brick, concrete, cabinet works, ironworks, etc. The Port of Baton Rouge sits at the head of deepwater navigation on the Mississippi River and ranks 9th in the nation and 32nd in the world in annual total tonnage[5]. The 2014 estimated population of East Baton Rouge was 446,042. [1]

Livingston Parish is one of the earliest settled parishes in the state and is comprised of 648.1 square miles. The estimated population of Livingston Parish in 2014 was 105,653. [1]

Iberville Parish is one of Louisiana's original 19 parishes and is comprised of 618.7 square miles. The estimated population of Iberville Parish in 2014 was 33,327. [1]

West Baton Rouge Parish is the smallest parish in the state covering 191.2 square miles. It is located on the west bank of the Mississippi River, across from metropolitan Baton Rouge. In 2014, the estimated population of West Baton Rouge Parish was 25,085. [1]

[4]Unites States Energy Information Administration: "Refinery Capacity Report." June 25, 2014.
[5] The Port of Greater Baton Rouge: "Fast Facts."http://www.portgbr.com/fast-factsfaqs

## 1.3 OZONE BACKGROUND

### 1.3.1 1-HOUR OZONE IN THE BATON ROUGE AREA

Louisiana's parishes have historically been in compliance with the Ozone NAAQS except for the BRNA. EPA first designated the BRNA as an ozone *nonattainment* area in 1978 (43 FR 8964, 8998). In 1991, the BRNA was designated *nonattainment* by operation of law, with the CAAA, and was classified as a *serious* ozone nonattainment area (56 FR 56694). The attainment date for the BRNA was November 15, 1999.

By operation of law contained in the CAAA, the failure of the BRNA to attain the standard was to be noticed by EPA and the area was to be bumped-up to the next higher classification, *severe*. Recognizing that some areas may have difficulty in achieving attainment due to transport from another area, EPA issued a guidance memorandum that allowed an area to retain its existing classification and receive a later attainment deadline if EPA found that the area met all of its existing classification requirements, approved a demonstration that the area would attain but for transport from another area, and approved the attainment demonstration SIP with its associated elements[6].

The Department submitted the Post 1996 Rate of Progress, Attainment Demonstration, and Contingency Plan to EPA and it was approved on July 2, 1999 (64 FR 35930). On May 9, 2001, EPA proposed that the BRNA did not attain the ozone standard by November 15, 1999 and recommended the BRNA be bumped-up to the *severe* classification. In a letter dated May 10, 2001, Governor Foster requested an extension of the attainment date for the BRNA under the 1998 Extension Policy and committed to submit a revised SIP that met the criteria for the Extension Policy. On October 2, 2002, EPA approved the revised attainment demonstration SIP and its associated elements, found the area met all of the serious area requirements, found there was transport from Texas affecting the BRNA's ability to reach attainment, and extended the attainment date for the BRNA to November 15, 2005, without reclassifying the area from *serious* to *severe*.

Following a ruling by the United States Court of Appeals for the Fifth Circuit vacating EPA's Extension Policy which was used to extend the 1-hour ozone attainment deadline for the Beaumont-Port Arthur, Texas Area, EPA withdrew its approval of the BRNA's revised attainment demonstration and granting of an extended attainment deadline; thus, reclassifying the BRNA by operation of law to *severe* on April 24, 2003 (68 FR 20077). This rule had an effective date of June 23, 2003.

The BRNA monitored attainment with the 1-hour NAAQS as of December 31, 2008. Accordingly, the Department submitted a request for determination of attainment based on

[6] "Guidance on Extension of Air Quality Attainment Dates for Downwind Transport Area" (Richard D. Wilson, Acting Assistant Administrator for Air and Radiation issued July 16, 1998, [64 FR 14441, March 29, 1999])

EPA's Clean Data Policy. On March 26, 2009, EPA proposed a determination of *attainment* of the 1-hour ozone standard for the BRNA. A final determination was published in the Federal Register on February 10, 2010 (75 FR 6570).

### 1.3.2 8-HOUR OZONE IN THE BRNA

In 1997, EPA promulgated a new, more protective standard for ozone based on an 8-hour average concentration (62 FR 38856). On April 15, 2004, EPA designated the BRNA as *nonattainment* and classified the area as *marginal* (69 FR 23858, April 30, 2004). This rule was effective June 15, 2004 and gave the BRNA an attainment date of June 15, 2007.

On March 21, 2008 EPA finalized its finding that the BRNA, by operation of law, was reclassified from a *marginal* to a *moderate* nonattainment area for 8-hour ozone effective on April 21, 2008 (73 FR 15087). The reallocation required the state to submit a SIP revision addressing the CAA's pollution control requirements for moderate 8-hour ozone nonattainment area. The area's new attainment deadline was June 15, 2010.

The BRNA monitored attainment with the 1997 8-Hour NAAQS for ozone as of December 31, 2008. Accordingly, LDEQ submitted a request for determination of attainment based on EPA's Clean Data Policy. On June 25, 2010, EPA proposed a determination of attainment of the 1997 8-Hour Ozone standard for the BRNA (75 FR 36316). A final determination was published in the Federal Register on September 9, 2010 (75 FR 54778).

At the request of the state, EPA proposed to redesignate the BRNA to *attainment* on August 30, 2011 (76 FR 53852). The request was published for final approval on November 30, 2011 (76 FR 74000).

On July 11, 2007, EPA proposed the 4$^{th}$ NAAQS revision for ozone (72 FR 37818). In the final rule published on March 27, 2008, the primary and secondary standards were set at 0.075 ppm (73 FR 16436).

Effective July 20, 2012, Louisiana was designated *nonattainment* and classified as *marginal* when nonattainment designations were published in the Federal Register on May 21, 2012. As such, the state was given an attainment date of December 31, 2015 (77 FR 30087).

As of December 31, 2013, and based upon complete, quality assured, certified ambient air monitoring data that showed the area monitored attainment for the 2008 8-hour Ozone NAAQS during the 2011-2013 monitoring period, the Department submitted a request for determination of *attainment* based on EPA's Clean Data Policy. In concurrence, EPA proposed and granted final approval on April 15, 2014 (72 FR 21139, 72 FR 21178).

## 1.3 LEGAL AUTHORITY

The Louisiana Environmental Quality Act, La.R.S.30.2001, et seq., grants the secretary of the Department specific authority to adopt, amend, or repeal those rules and regulations that are deemed necessary for the protection of the state's environment. Further, this act provides the secretary with the general power to assure compliance with applicable federal laws and regulations and to assume authority for those delegated programs that exist under the provision of the CAAA. Furthermore, on February 22, 2010, Governor Bobby Jindal appointed Peggy M. Hatch, Secretary of the Louisiana Department of Environmental Quality, as his designee to submit documents to the EPA for approval and incorporation into the SIP for Louisiana, *see Appendix A*.

## 1.4 PUBLIC NOTICE

In accordance with La. R.S. 49.950 et seq., and to comply with 40 CFR 51.285 Public Notification, the Department published a notice seeking comment on this SIP revision on June 20, 2015, in the *Louisiana Register*. A public hearing concerning this proposed SIP revision will be held at 1:30 pm on July 29, 2015 in the Galvez Building, Oliver Pollock Room C-111, located at 602 North Fifth Street in Baton Rouge, Louisiana 70802. The comment period ends on July 31, 2015. A copy of the notice is included in *Appendix B* for review.

## SECTION 2: REDESIGNATION REQUIREMENTS

Section 107(d)(3)(E) of the CAAA states that an area can be redesignated to attainment if all the following conditions are met:

- The EPA has determined that the NAAQS have been attained.
- The applicable implementation plan has been fully approved by the EPA under Section 110(k).
- The EPA has determined that the improvement in air quality is due to permanent and enforceable reduction in emissions.
- The state has met all applicable requirements for the area under Section 110 and Part D.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

### 2.1 ATTAINMENT OF THE STANDARD

The BRNA ozone monitoring network currently consists of eight ambient air monitors, *see Figure 2.1.1*. Compliance with the 2008 8-Hour Ozone NAAQS is determined by the area's design value (DV) which is defined as the consecutive three-year average of each annual fourth-highest daily maximum 8-Hour ozone average. Quality assured data from this monitoring network shows the area has monitored attainment of the 2008 8-Hour Ozone NAAQS during the 2011-2013 monitoring period with a DV of 75 ppb, which is equal to the attainment threshold. The BRNA achieved attainment of the standard two years ahead of the scheduled attainment date. EPA concurred with this assessment by approving the Department's Clean Data Determination on April 15, 2014, *see Appendix C*. Further, the 2014 DV for the BRNA has decreased to 72 ppb, *see Table 2.1.2 and Figure 2.1.3*.

**FIGURE 2.1.1: BRNA ACTIVE MONITORING NETWORK**

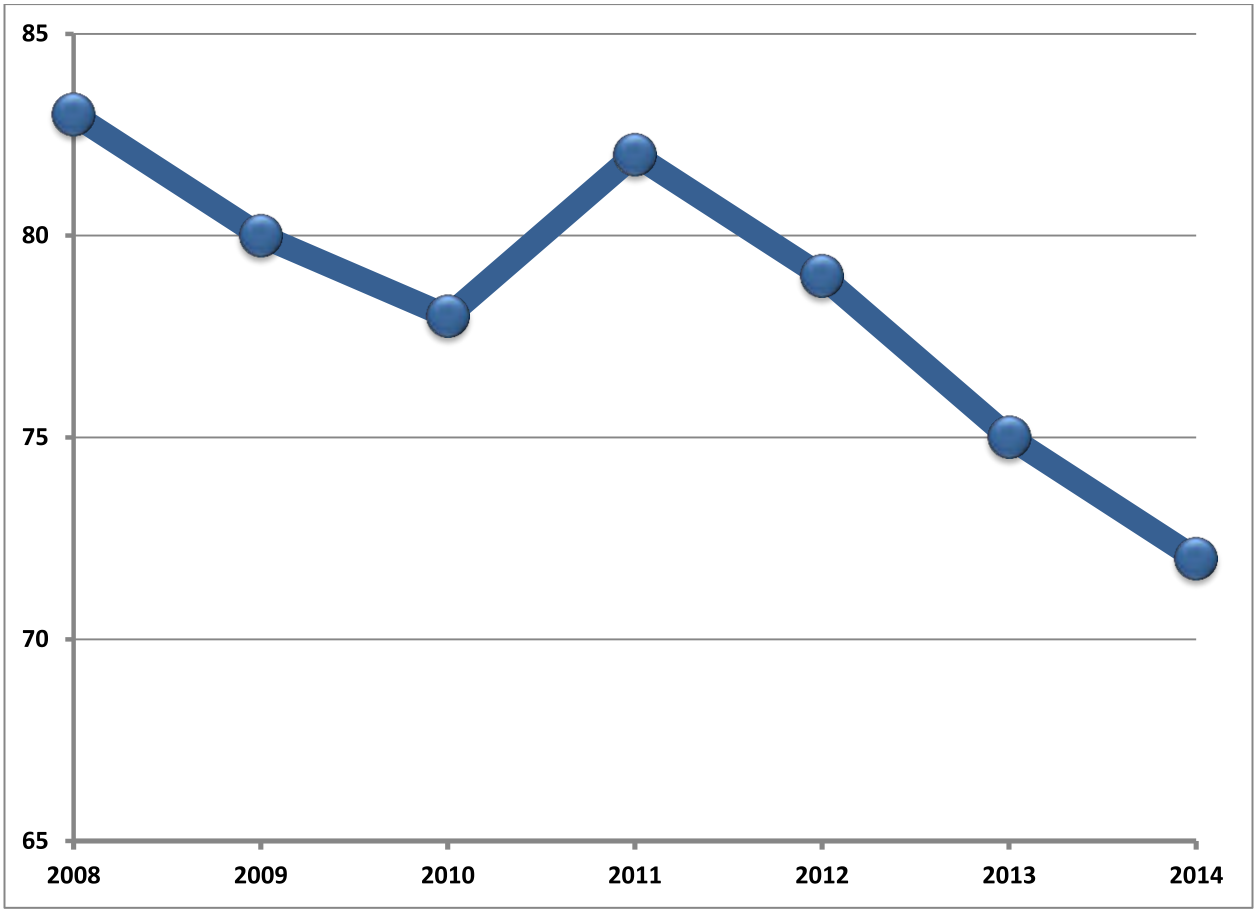

**TABLE 2.1.2: BRNA MONITORS: 8-HOUR OZONE DESIGN VALUES 2008-2014**

| Monitor | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| Baker* | 79 | 73 | 72 | | | | |
| Bayou Plaquemine | 79 | 75 | 73 | 74 | 75 | 71 | 65 |
| Capitol | 75 | 72 | 73 | 77 | 76 | 72 | 69 |
| Carville | 81 | 78 | 73 | 77 | 76 | 75 | 69 |
| Dutchtown | 83 | 78 | 75 | 77 | 76 | 71 | 67 |
| French Settlement | 79 | 78 | 75 | 76 | 74 | 72 | 71 |
| Grosse Tete* | 80 | 75 | 71 | | | | |
| LSU | 80 | 80 | 78 | 82 | 79 | 75 | 72 |
| Port Allen | 78 | 73 | 71 | 72 | 71 | 68 | 65 |
| Pride | 77 | 74 | 72 | 72 | 72 | 69 | 66 |

**At the request of the Department[7], EPA approved the decommissioning of the Baker and Grosse Tete monitors on October 29, 2010[8]. These two monitors ranked among the lowest in the Baton Rouge area regarding ozone concentrations, and the closing of these two sites helped enable the best use of resources. The monitors were decommissioned on November 10, 2010.*

[7]Hatch, Peggy M. Letter to Dr. Al Armendariz. August 9, 2010. TS
[8]Edlund, Carl E., P.E.. Letter to Peggy M. Hatch. October 20, 2010. TS

**FIGURE 2.1.3: BRNA DESIGN VALUES 2008-2014**



## 2.2 SIP APPROVABILITY

The SIP for the BRNA must be fully approved by EPA under Section 110(k) of the CAAA. With the promulgation of the 2008 8-hour Ozone NAAQS, the Department submitted the 2008 ozone Infrastructure SIP on June 4, 2013, *see Appendix C*. The plan was deemed administratively complete by operation of law on December 7, 2013.

## 2.3 PERMANENT AND ENFORCEABLE EMISSIONS REDUCTIONS

The BRNA has experienced improved air quality over the past several years as evidenced by decreases in 8-hour ozone precursors emission inventories (EIs). The reduced EIs are due to permanent and enforceable reductions in volatile organic compounds (VOC) and oxides of nitrogen (NOx) emissions through control strategies implemented in the area. The strategies implemented in the BRNA include, but are not limited to, the following:

- Point Source NOx
- National Volatile Organic Compound Emission Standards for Consumer Products
- National Organic Compound Emission Standards for Architectural Coatings
- National Low Emission Vehicle (NLEV) Program/Tier II Engine and Fuel Standards
- Stage I Vapor Recovery
- Stage II Vapor Recovery
- Locomotives and Marine Compression-Ignition Engines
- 2004 Clean Air Non-Road Diesel Rule

The Department has also submitted multiple SIP elements that show implementation of the rules promulgated by the state to allow for enforceable control strategies in the BRNA. These are SIP elements that have been approved by EPA and published in the Federal Register. The SIP elements along with the Federal Register notice information and approval dates are listed in *Table 2.3.1.* The list of the associated rules promulgated by the state and the facilities in the BRNA to which they are applicable are found in *Appendix H*.

## TABLE 2.3.1 BRNA SIP ELEMENTS

| SIP ELEMENT | PAGE NUMBER | APPROVAL DATE | DATE SUBMITTED |
|---|---|---|---|
| 2011-2013 PERMIT RULES SIP REVISION | | | 11/4/2014 |
| 2008 OZONE INFRASTRUCTURE SIP | | | 6/4/2013 |
| 2010 NOx INFRASTRUCTURE SIP | | | 12/20/2012 |
| PM 2.5 NNSR SIP REVISION | | | 5/16/2012 |
| 2008-2010 MISCELLANEOUS RULES SIP REVISION | | | 2/20/2012 |
| 2008-2010 PERMIT RULES SIP REVISION | | | 2/20/2012 |
| 2008-2010 VOLATILE ORGANIC COMPOUND RULES SIP REVISION | | | 2/20/2012 |
| 2010 $SO_2$ INFRASTRUCTURE SIP | | | 2/20/2012 |
| GHG TAILORING RULE | | | 12/21/2011 |
| PARALLEL PROCESSING OF REVISIONS TO LAC 33:III.2123 ORGANIC SOLVENTS WITH THE CTG SIP SUBMITTAL | 76 FR 30924 | 2/7/2011 | 12/2/2011 |
| LEAD INFRASTRUCTURE SIP | | | 10/10/2011 |
| BATON ROUGE NONATTAINMENT AREA REDESIGNATION AND MAINTENANCE PLAN, TECHNICAL AMENDMENT TO SECTION 5, ATTAINMENT INVENTORY AND SUPPORTING APPENDIX E DOCUMENTATION | 76 FR 74000 | 11/30/2011 | 2/14/2011 |
| VOC RACT CONTROL TECHNIQUE GUIDELINES | 76 FR 30924 | 12/2/2012 | 8/31/2010 |
| BATON ROUGE 1997 8 HOUR MODERATE RECLASSIFICATION | 76 FR 74000 | 11/30/2011 | 8/31/2010 |
| BATON ROUGE OZONE AREA REDESIGNATION REQUEST | 76 FR 74000 | 11/30/2011 | 8/31/2010 |
| SECTION 185 DETERMINATION TERMINATION-BATON ROUGE NONATTAINMENT AREA | 76 FR 39775 | 7/7/2011 | 5/18/2010 |
| CLEAN AIR INTERSTATE RULE (CAIR) NOx TRADING | | | 7/1/2009 |
| 2002 LOUISIANA BASE YEAR EMISSION INVENTORY | 74 FR 45561 | 9/3 /2009 | 7/20/2007 |
| CLEAN AIR INTERSTATE (CAIR) NOx TRADING PROGRAM | 72 FR 55064 | 9/28/2007 | 7/12/2007 |
| 111(D) PLAN FOR OTHER SOLID WASTE INCINERATION UNITS | | | 11/29/2006 |
| 111(D) PLAN FOR COAL-FIRED ELECTRICAL STEAM GENERATING UNITS | 72 FR 46161 | 8/17/2007 | 10/25/2006 |
| CLEAN AIR INTERSTATE RULE (CAIR) $SO_2$ TRADING PROGRAM | 72 FR 39741 | 7/20/2007 | 9/22/2006 |
| VEHICLE INSPECTION/MAINTENANCE PROGRAM | 71 FR 66113 | 11/13/2006 | 5/5 /2006 |
| BATON ROUGE POST 1999 RATE OF PROGRESS | | | 5/9/2005 |
| ATTAINMENT DEMONSTRATION FOR THE SHREVEPORT-BOSSIER CITY EARLY ACTION COMPACT AREA. | 70 FR 48880 | 8/22/2005 | 12/28/2004 |
| 15% ROP PLAN | 61 FR 54742 | 10/22/1996 | 12/15/1995 |
| GENERAL CONFORMITY | 61 FR 48409 | 9 /13/1996 | 12/5/1995 |
| 182 (F) EXEMPTION TO THE NOx TRANSPORTATION CONFORMITY FOR THE BR OZONE NONATTAINMENT AREA | 61 FR 7218 | 2/27/1996 | 7/25/1995 |
| PSD SIP REVISION | 61 FR 53642 | 10/15/1996 | 3/22/1995 |
| 182 (F) EXEMPTION TO THE NOx CONTROL REQUIREMENTS FOR THE BATON ROUGE OZONE NONATTAINMENT AREA | 61 FR 2438 | 1/26/1996 | 11/17/1994 |
| CLEAN FUEL FLEET PROGRAM SIP | 60 FR 54305 | 10/23/1995 | 5/16/1994 |
| TITLE V OPERATING PERMITS PROGRAM | 60 FR 47297 | 9/12/1995 | 11/15/1993 |
| PAMS SIP FOR THE BR OZONE NONATTAINMENT AREA | 61 FR 31037 | 6/19/1996 | 9/10/1993 |
| VOC RACT CATCH-UPS | 61 FR 38591 | 7/25/1996 | 4/13/1993 |

| SIP ELEMENT | PAGE NUMBER | APPROVAL DATE | DATE SUBMITTED |
|---|---|---|---|
| 1990 BASE YEAR EMISSIONS INVENTORY BATON ROUGE & CALCASIEU OZONE NONATTAINMENT AREAS | 60 FR 13908 | 3/15/1995 | 11/16/1992 |
| EMISSION STATEMENT APPROVAL 919 | 60 FR 2016 | 1/6 /1995 | 3/3/1992 |
| 111(D) COMMERCIAL AND INDUSTRIAL SOLID WASTE INCINERATORS | 69 FR 9949 | 3/3/2004 | |
| 111(D) SMALL MUNICIPAL WASTE COMBUSTERS | 68 FR 35299 | 6/13/2003 | |
| 111(D) LARGE MUNICIPAL WASTE COMBUSTERS | 65 FR 33466 | 5/24/2000 | |
| 111(D) HOSPITAL/MEDICAL INFECTIOUS WASTE INCINERATORS | 64 FR 32430 | 6/17/1999 | |
| 111(D) MUNICIPAL SOLID WASTE LANDFILLS | 62 FR 45730 | 8/29/1997 | |
| PSD SIP | 62 FR 9080 | 2/28/1997 | |
| TRANSPORTATION CONFORMITY RULE AMENDMENTS; MISCELLANEOUS REVISIONS | 60 FR 57179 | 11/14/1995 | |
| TRANSPORTATION CONFORMITY RULE AMENDMENTS: AUTHORITY FOR TRANSPORTATION CONFORMITY NOx WAIVERS (40 CFR PARTS 51 & 93) | 60 FR 44762 | 8/29/1995 | |
| REQUIREMENTS FOR PREPARATION, ADOPTION, & SUBMITTAL OF IMPLEMENTATION PLANS (SIPS) | 60 FR 40465 | 8/9/1995 | |
| TRANSPORTATION CONFORMITY RULE AMENDMENTS: TRANSITION TO THE CONTROL STRATEGY PERIOD | 60 FR 40098 | 8/7/1995 | |
| REMOVAL OF LEGALLY OBSOLETE RULES FROM 40 CFR PARTS 51, 52, 60, 65, 85, & 86 | 60 FR 33915 | 6/29/1995 | |
| ASBESTOS WAIVER APPROVAL | 60 FR 18364 | 4/11/1995 | |
| TRANSPORTATION CONFORMITY RULE AMENDMENTS: TRANSITION TO THE CONTROL STRATEGY PERIOD (40 CFR PARTS 59 & 93) | 60 FR 7449 | 2/8 /1995 | |
| ALTERNATIVE EMISSION REDUCTION (BUBBLE) PLAN FOR DOW CHEMICAL, USA LA DIV, PLAQUEMINE, LA | 59 FR 50502 | 10/4/1994 | |
| RACT FIX-UP APPROVAL (CHAPTERS 1, 21, & 61) | 59 FR 23166 | 5/5/1994 | |
| STAGE II VAPOR RECOVERY PROGRAM SIP | 59 FR 14114 | 3/25/1994 | |
| REVISION TO SIP CORRECTING SULFUR DIOXIDE ($SO_2$) ENFORCEABILITY DEFICIENCIES (LAC 33:CHAPTER 15) | 58 FR 38060 | 7/15/1993 | |
| TECHNICAL AMENDMENTS TO IDENTIFICATION OF PLAN: CORRECT ERRONEOUS APPROVAL OF LAQR 6.6 TO LAC 33:III.505.I (PUBLIC COMMENT PROVISIONS | 57 FR 8075 | 3/6/1992 | |
| DESIGNATION OF AREAS FOR AIR QUALITY PLANNING PURPOSES | 56 FR 56708 | 11/6/1991 | |
| SIP COMPLETENESS CRITERIA | 56 FR 42216 | 8/26/1991 | |
| APPROVAL OF PSD RULES | 56 FR 20139 | 5/2/1991 | |
| PARTIAL APPROVAL OF CHAPTER 21 VOC REGS SPECIFIC TO AUTOMOBILE & LIGHT TRUCK SURFACE COATING (2123.C.6 & D.3 - 02/20/90) AS PART OF THE POST 1987 SIP REVISIONS | 55 FR 36811 | 9/7/1990 | |
| APPROVAL & PROMULGATION OF IMPLEMENTATION PLANS; COMPLIANCE W/STATUTORY PROVISIONS; NOTICE OF SIP INADEQUACY & CALL FOR SIP | 55 FR 30973 | 7/30/1990 | |

## 2.4 REQUIREMENTS MET FOR THE AREA UNDER SECTION 110 AND PART D

### 2.4.1 SECTION 110 REQUIREMENTS

EPA has stated Section 110 elements that are not connected with nonattainment plan submissions or linked with an area's attainment status are not applicable requirements for the purposes for redesignation (76 FR 53870). However, a list of the Section 110 requirements and how the state has met these requirements is listed below.

**Ambient Air quality monitoring/data system:** LDEQ meets the applicability requirements of Section 110(a)(2)(B) though the operations of a statewide monitoring network, made up of stationary ambient air monitoring stations. The data collected from these monitors is reported to EPA on a regular basis.

**Program for enforcement of control measures:** LDEQ has established rules governing emissions in the nonattainment area. These rules were submitted to EPA in various SIP revisions and have been approved in the Federal Register, thus satisfying the requirements of Section 110(a)(2)(C).

**Interstate Transport:** During ozone season, Louisiana is covered under CSAPR for summertime NOx. The Department is working with EPA on SIP transport elements.

**Adequate Resources:** Subtitle II of Title 30 of the Louisiana Revised Statutes provides that the Department secretary shall "receive and budget duly appropriated monies … to carry out the provisions and purposes of this Subtitle." (La. R.S. 30:2011.D.10)

**Stationary source monitoring system:** The most current revision to the SIP concerning stationary source emissions monitoring was submitted to EPA on November 15, 1994 and was approved on February 6, 1995 (60 FR 02014). This SIP revision meets all requirements set forth in Section 110(a)(2)(F).

**Emergency Power:** The "Prevention of Air Pollution Emergency Episodes" provision was promulgated by the Department on December 20, 1987. Revisions were made to the SIP in January 1988, and approved on March 8, 1989 (54 FR 09795).

**Provisions for SIP revision due to NAAQS changes or findings of inadequacies:** Louisiana, through the Department, has revised the SIP necessary to comply with changes to NAAQS or findings of inadequacies. See 54 FR 25449 for revisions concerning PM NAAQS.

**Section 121 Consultants:** The Department, through established public hearing processes and laws governing public participation, meets the applicable requirements of Section 121 relating to consultation as required by Section 110(a)(2)(J).

**PSD and Visibility protection:** Louisiana meets the applicability requirements of Section 110(a)(2)(J) through various SIP revisions.

The PSD SIP was first approved on October 28, 1990 (56 FR 20137) with subsequent revisions being approved October 15, 1996 (61 FR 53639).

Visibility Protection requirements were met through the submittal of the Visibility Analysis and Long Term Strategy, submitted on October 26, 1987 and approved on December 19, 1988 (53 FR 50958). The regional haze SIP revisions were submitted to EPA on June 13, 2008. EPA finalized a limited disapproval on August 6, 2012 because Louisiana relied on requirements of the Clean Air Interstate Rule (CAIR) to satisfy some of the requirements. However, the D.C. Circuit Court of Appeals invalidated the CSAPR on August 21, 2012. This decision was later overturned by the Supreme Court of the United States on April 29, 2014. In light of the final ruling, the Department is working with EPA to resolve aforementioned deficiencies and modify the Regional Haze SIP.

**Air Quality modeling/data:** Modeling is not required for marginal nonattainment areas. However, Louisiana submits the following:

- Technical Support Document – Photochemical Modeling for the Louisiana 8-hour ozone State Implementation Plan, and
- Technical Support Document – Future Year Emissions Inventory Projections for the Baton Rouge 5-Parish Ozone Nonattainment Area.

These documents can be found in *Appendix E and F*, respectively.

**Permitting Fees:** The Department's fee system was approved by EPA on July 7, 1982 (47 FR 29535).

**Consultation/participation by affected local entities:** The Department, through the established public hearing process and laws governing public participation, meets the applicable requirements of Section 110(a)(2)(M).

### 2.4.2 PART D REQUIREMENTS

Part D, Subparts 1 and 2 address the requirements for nonattainment areas in general and specifically those provisions for ozone nonattainment areas. The BRNA was classified as *marginal* in its designation; therefore, a SIP revision is required by December 31, 2015, the attainment date. In lieu of required revision and as a result of attaining the standard prior to this date, the BRNA is submitting this request for redesignation.

The BRNA continues to meet all applicable requirements outlined in 1997 8 hour ozone maintenance plan. The state continues to implement control measures and enforce all applicable rules including anti-backsliding provisions.

## 2.5 SECTION 175A REQUIREMENTS FOR MAINTENANCE PLANS

The remainder of this SIP revision is intended to fulfill the maintenance requirements in Section 175A of the CAA and contains the following elements[9]:

- Attainment Inventory;

[9] EPA: "Procedures for Processing Requests to Redesignate Areas to Attainment" Memorandum from John Calcagni, Director, Air Quality Management Division, September 4, 1992.

- Maintenance Demonstration;
- Verification of Continued Attainment;
- Monitoring Network; and
- Contingency Plan.

# SECTION 3: EMISSIONS INVENTORY

## 3.1 OVERVIEW

Section 110(a)(2)(B) of the CAAA and the Air Emissions Reporting Requirements (AERR) require that emissions inventories (EIs) be prepared for ozone nonattainment areas (73 FR 76539). Because ozone is photochemically produced in the atmosphere when VOCs and NOx mix in the presence of sunlight, information on sources of these precursor pollutants must be compiled. The EI identifies the types of emission sources present in the area, the amount of each pollutant emitted, and the types of processes and control devices employed at each plant or source category. The EI provides data for a variety of air quality planning tasks, including:

- establishing baseline emission levels;
- calculating emission reduction targets;
- developing control strategies for achieving the required emission reductions;
- providing emissions inputs into air quality simulation models; and
- tracking actual emission reduction against the established emission growth and control budgets.

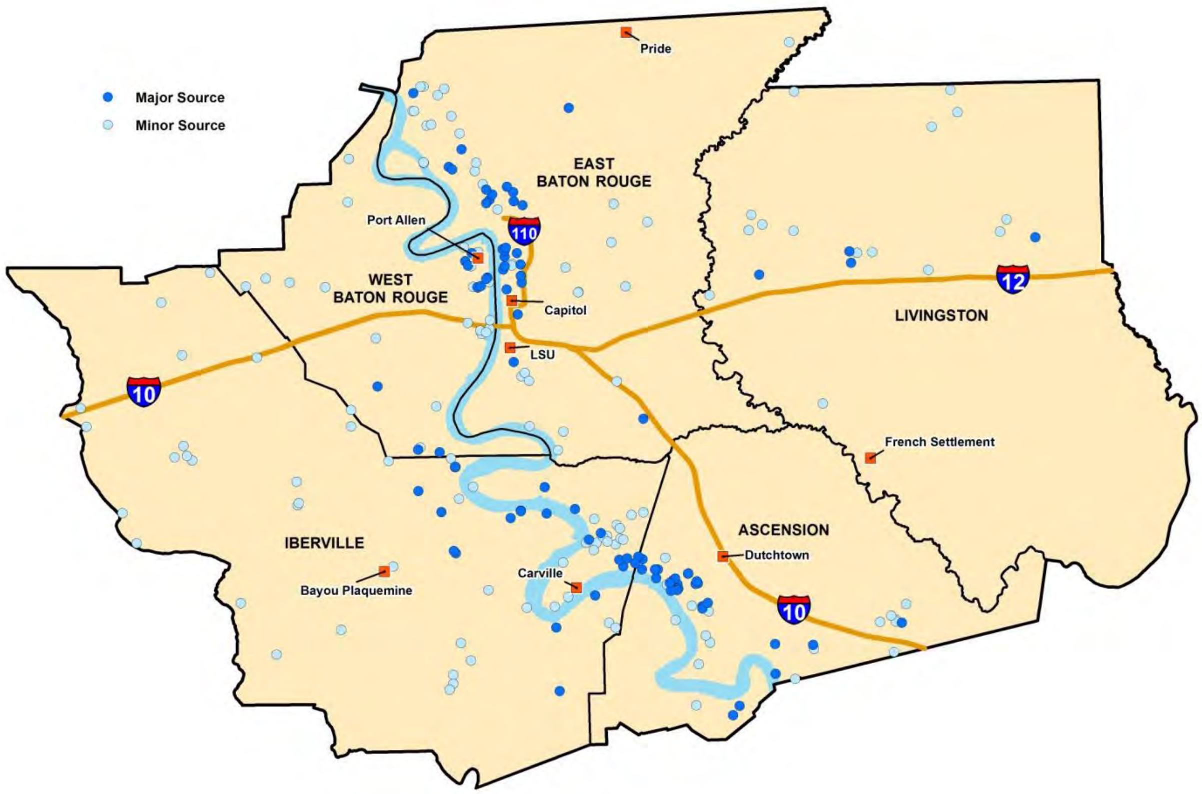
The inventory of emissions of NOx, and VOC for an area is summarized from the estimates developed for four general categories of emissions sources: point, nonpoint, onroad mobile, and nonroad mobile. An in-depth discussion on the development of the 2011 baseline emissions can be found in *Appendix F*.

## 3.2 POINT SOURCES

The state of Louisiana compiles a statewide EI for point sources on an annual basis. For the purpose of EI, point sources that emit 100 tons or more per year of a criteria pollutant meet the reporting threshold. In the BRNA all sources that emit 10 tons of VOC or 25 tons of NOx are required to report. Each of the facilities meeting these emissions criteria submit complete EI reports which contain site-specific data in conformance with EPA guidance for ozone maintenance areas. A list of the 230 point sources, located in the BRNA as of May 15, 2015, is included in *Appendix G* and visually represented in *Figure 3.2.1*.

The reporting requirements for the nonattainment areas are in accordance with those of the CAAA and LAC 33:III.918 and 919 – Recordkeeping and Annual Reporting and Emissions Inventory. Emissions data provided by the facilities are estimates of actual emissions for the facility during the previous calendar year. Actual measurement with continuous emissions monitoring systems (CEMS) or approved stack testing shall be used for reporting of emissions from an emissions point when such data exists. In the absence of CEMS or stack test data, emissions shall be calculated using methods found in the most recent edition, as of December 31 of the current reporting year, of EPA's Compilation of Air Pollution Emission Factors (AP-42), calculations published in engineering journals, and/or EPA or department-approved estimation methodologies.

**FIGURE 3.2.1: POINT SOURCES SUBMITTING EIS**




## 3.3 NONPOINT SOURCES

Nonpoint sources, also known as area sources, are represented as many small, individually unidentified points of air pollution emissions within a specified geographical area. These small-scale industrial, commercial, and residential sources that generate emissions are too numerous or too small to be addressed individually and include, but are not limited to, activities such as fuel combustion, dry cleaning, bakeries, graphic arts, auto refinishing, product storage, agriculture activities, and consumer product usage. Emission factors used to estimate emissions are developed and applied for the aggregate source categories. Biogenic VOC emissions are also included in the nonpoint source category.

## 3.4 ONROAD MOBILE SOURCES

Onroad mobile vehicles are light and heavy duty, gasoline and diesel automobiles and trucks that travel primarily on public highways. Onroad mobile emissions are pollutants emitted from motor vehicles during driving operation and while parked. Emissions from the refueling of motor vehicles at service stations, Stage 2 refueling, are included under nonpoint source emissions. Onroad mobile emissions estimates within the nonattainment area were developed based on parish-specific inputs provided by the Department of Transportation and Development and the

Capitol Region Planning Commission. All onroad emissions were derived using the Motor Vehicle Emission Simulator (MOVES 2010b).

## 3.5 NONROAD MOBILE SOURCES

Nonroad mobile sources are often included as nonpoint sources because of the number and size of sources. Nonroad mobile sources include, but are not limited to, railroad locomotives, aircraft and airport support equipment, commercial and recreational marine vessels, construction equipment, agricultural equipment, commercial and recreational lawn equipment, and recreational vehicles. The National Mobile Inventory Model (NMIM) was used to generate parish level nonroad equipment emission estimates.

## SECTION 4: ATTAINMENT INVENTORY

### 4.1 INVENTORY DESCRIPTION

Louisiana emissions for 2011 were extracted from the EPA 2011 National Emissions Inventory (NEI), Version 2.[10] The table below summarizes the 2011 NOx and VOC emission totals by source category which comprises the baseline inventory for the BRNA.

**TABLE 4.1.1 2011 REPORTED EMISSIONS (TONS/DAY)**

| | NOx | | | | Emission |
|---|---|---|---|---|---|
| | **Nonpoint** | **Nonroad** | **Onroad** | **Point** | **Total** |
| Ascension | 7.98 | 1.02 | 5.23 | 20.92 | **35.15** |
| East Baton Rouge | 13.03 | 3.85 | 18.64 | 24.79 | **60.32** |
| Iberville | 10.48 | 0.66 | 2.69 | 25.60 | **39.43** |
| Livingston | 1.90 | 0.87 | 8.39 | 0.17 | **11.33** |
| West Baton Rouge | 6.30 | 0.38 | 3.45 | 2.69 | **12.81** |
| **BRNA Total** | **39.69** | **6.78** | **38.40** | **74.17** | **159.04** |
| | **VOC** | | | | **Emission** |
| | **Nonpoint** | **Nonroad** | **Onroad** | **Point** | **Total** |
| Ascension | 44.99 | 0.67 | 2.75 | 8.50 | **56.91** |
| East Baton Rouge | 65.68 | 3.12 | 10.16 | 15.05 | **94.00** |
| Iberville | 62.22 | 0.66 | 1.09 | 7.21 | **71.19** |
| Livingston | 67.28 | 1.79 | 4.14 | 0.87 | **74.08** |
| West Baton Rouge | 22.00 | 1.11 | 1.04 | 1.96 | **26.11** |
| **BRNA Total** | **262.17** | **7.36** | **19.17** | **33.59** | **322.29** |

### 4.2 PROJECTED EMISSIONS INVENTORY

EPA-accepted tools, datasets, and methodologies were applied to develop the 2027 projected inventory from the 2011 baseline inventory presented above. The future year modeling includes all anthropogenic source sectors emitting ozone precursors.

[10] 2011 National Emissions Inventory, Version 2. U.S. Environmental Protection Agency, Office of Air Quality, Planning, and Standards, Emission Inventory Group. Released December 12, 2014. Downloaded December 16, 2014.

**TABLE 4.2.1 2027 PROJECTED EMISSIONS (TONS/DAY)**

| | NOx | | | | Emission |
|---|---|---|---|---|---|
| | Nonpoint | Nonroad | Onroad | Point | Total |
| Ascension | 4.00 | 2.70 | 2.20 | 29.70 | **38.60** |
| East Baton Rouge | 9.40 | 5.60 | 4.60 | 31.30 | **50.90** |
| Iberville | 3.90 | 4.00 | 0.07 | 36.90 | **44.87** |
| Livingston | 2.30 | 0.60 | 2.60 | 0.03 | **5.53** |
| West Baton Rouge | 2.50 | 2.30 | 0.90 | 3.70 | **9.40** |
| **BRNA Total** | **22.10** | **15.20** | **10.37** | **101.63** | **149.30** |
| | **VOC** | | | | **Emission** |
| | **Nonpoint** | **Nonroad** | **Onroad** | **Point** | **Total** |
| Ascension | 53.30 | 0.60 | 2.50 | 13.30 | **69.70** |
| East Baton Rouge | 71.40 | 3.00 | 5.00 | 24.50 | **103.90** |
| Iberville | 66.00 | 0.50 | 0.40 | 11.20 | **78.10** |
| Livingston | 75.30 | 1.10 | 3.10 | 1.30 | **80.80** |
| West Baton Rouge | 23.20 | 0.90 | 0.40 | 2.90 | **27.40** |
| **BRNA Total** | **289.20** | **6.10** | **11.40** | **53.20** | **359.90** |

In-depth discussions on the methodology for the development of point, nonpoint, onroad and nonroad emissions; and other considerations as well as reference documentation can be found in sections 2, 3, and 4 of the Technical Support Document - Future Year Emission Inventory Projections for the Baton Rouge 5-Parish Ozone Nonattainment Area, *see Appendix F*.

## 4.3 EMISSIONS INVENTORY SUMMARY

The table below summarizes the categorized NOx and VOC emissions for the BRNA. For the purposes of comparison, the Department has included data from the 2010 baseline EI and projected 2017 emissions from the Technical Support Document – Photochemical Modeling for the Louisiana 8-hour ozone State Implementation Plan found in *Appendix E.*

**TABLE 4.3.1 EMISSION COMPARISON (TONS/DAY)**

| | 2010 | 2011 | 2017 | 2027 | Δ2011-2027 |
|---|---|---|---|---|---|
| BRNA Total NOx | 130.84 | 159.04 | 113.86 | 149.30 | -6.12% |
| BRNA Total VOC | 153.52 | 322.29* | 146.34 | 359.90* | 11.67% |
| BRNA Design Value | 79 | 82 | 73 | - | - |

*2011 and 2027 data include the addition of biogenic emissions.

Overall, both the 2017 and 2027 emissions projections from their respective baselines show decreases in NOx emissions.

The increases in VOC emissions from 2011 to 2027 can be broken down into increases in nonpoint and point source VOC emission categories. Increases in area source VOC emissions are 10.31% and can be attributed to population growth factors.

The 2011 to 2027 data projects a point source emissions increase of 19.61 tons per day (tpd). However, the projected data is based on theoretical growth in the area due to the utilization of high projection factors that were based on optimistic development scenarios from the United States Energy Information Administration (EIA) Annual Energy Outlook. These projections failed to account for any controls that would be required on the potential projects commencing in the BRNA. Additionally, the projections did not take into account all projects must go through the nonattainment new source review process (NNSR). With this process, any significant increases in VOCs would need to be offset to provide a net air quality benefit. Finally, the projections did not account for other emission reducing efforts that have been proposed, including the Clean Power Plan.

Historically, the BRNA has shown consistent reductions in VOC emissions. Based on the continued implementation of state and federal rules, the Department ascertains projections using regional growth data such as that used in the 2017 emissions estimates and described in *Appendix E*, are more realistic and representative of the BRNA actual expected emissions. 2017 estimated emissions show an overall decrease of 4.91%.

To further support the Department’s position that the BRNA will continue to attain the 2008 8 hour Ozone NAAQS, DVs from 2010 and 2011 as well as a 2017 DV projection from the 2010 baseline is also presented. The 2017 estimate was obtained following EPA guidance by utilizing the EPA Modeled Attainment Test Software (MATS) tool, *see Appendix E*. The projection is consistent with monitoring data that shows an overall downward trend in monitored ozone concentrations.

# SECTION 5: MAINTENANCE DEMONSTRATION

## 5.1 DEMONSTRATION REQUIREMENT

The maintenance plan must demonstrate that the area will remain in compliance with the 2008 8-hour Ozone NAAQs for the ten year period following the effective date of designation. The end projection year for the maintenance plan is ten (10) years from the effective date of the attainment demonstration. The maintenance demonstration is satisfied if the state demonstrates that future emissions inventories are less than the attainment or baseline inventory. The state has identified the level of precursor emissions in the BRNA that is sufficient to attain the NAAQS in the 2011 attainment inventory. The state has established interim emissions projections for 2017 and emissions projections for 2027 of ozone precursors to demonstrate maintenance. A comparison of emission growth projections for NOx and VOC through 2027 for the Baton Rouge Ozone Maintenance Area (BROMA) indicates a downward trend in NOx emissions. Through the discussion in *Section 4.3*, the Department ascertains 2027 emissions will also remain at a level that will continue to support the attainment of the standard.

## 5.2 PLAN TO MAINTAIN AIR QUALITY

The state has implemented enforceable emission control regulations to ensure continued maintenance of the ozone standard. Control measures also have been developed, promulgated, and implemented at the federal level to reduce ozone-forming emissions of VOC and NOx. Development and subsequent implementation of other federal measures will result in additional emission reductions of VOC and NOx during the 10-year maintenance period. Federal measures which have been implemented or are currently in some phase of implementation include, but are not limited to:

- Various New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP)to control VOC and NOx
- Tier 2 – Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements (65 FR 6697)
- Tier 3 – Motor Vehicle Emission and Fuel Standards (79 FR 23414)
- Tier 4 – Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements – Tier 4(66 FR 5002)
- Control of Emissions from Nonroad Diesel Engines and Fuels (69 FR 38958)
- Cross-State Air Pollution Rule (CSAPR) (79 FR 71663)
- Control of Air Pollution From Aircraft and Aircraft Engines; Proposed Emission Standards and Test Procedures (76 FR 45012)
- Carbon Pollution Emission Guidelines for Existing Stationary Sources: EGUs (electric generating units) in Indian Country and U.S. Territories (79 FR 34829)

# SECTION 6: AMBIENT AIR QUALITY MONITORING

## 6.1 ATTAINMENT OF THE 8-HOUR OZONE STANDARD

The monitoring sites in the BRNA have operated in accordance with the requirements of 40 CFR 58 and the EPA-approved Quality Assurance Program Plan. The 8-hour Ozone NAAQS is 75 ppb and based on an 8-hour average sample.

The BRNA monitored attainment of the standard during the 2011–2013 monitoring period with a DV of 75 ppb. The monitoring network for the BRNA currently consists of 8 monitors located throughout the area, *see Table 6.1.1 and Figure 2.1.1*.

**TABLE 6.1.1 BRNA OZONE MONITORS**

| AQS NUMBER | MONITOR | PARISH |
|---|---|---|
| 220470009 | Bayou Plaquemine | Iberville |
| 220330009 | Capitol | East Baton Rouge |
| 220470012 | Carville | Iberville |
| 220050004 | Dutchtown | Ascension |
| 220630002 | French Settlement | Livingston |
| 220330003 | LSU | East Baton Rouge |
| 221210001 | Port Allen | West Baton Rouge |
| 220330013 | Pride | East Baton Rouge |

The Department is committed to keeping an adequate monitoring network in place throughout the maintenance period. The monitors will be used to detect if and when appropriate levels have been exceeded for contingency measure triggering purposes. Louisiana commits to continue to operate an appropriate air quality monitoring network in accordance with 40 CFR 58.

## SECTION 7: VERIFICATION OF CONTINUED ATTAINMENT

Louisiana will continue to operate an ambient ozone monitoring network to verify continued attainment of the 8-hour Ozone NAAQS. The air monitoring results will reveal changes in the ambient air quality as well as assist Louisiana in determining whether or not implementation of any contingency measures is necessary. The state will continue to work with EPA through the air monitoring network review process, as required by 40 CFR 58, to determine:

1) the adequacy of the ozone monitoring network;

2) if additional monitoring is needed; and

3) when monitoring can be discontinued.

Air monitoring data will continue to be quality assured according to federal requirements.

Louisiana will also make comparisons of the EI data submitted on a triennial basis to the NEI with the emission growth data submitted in this plan to ensure emission reductions continue the downward trend.

# SECTION 8: CONTINGENCY PLAN

## 8.1 CONTINGENCY IMPLEMENTATION

Section 175A maintenance plan requirements include contingency measures that are capable of promptly addressing any violation of the NAAQS that might occur. The contingency plan ensures that contingency measures are adopted expeditiously once they are triggered.

The contingency plan for the ozone maintenance area is triggered upon monitoring a violation of the 2008 8-hour Ozone NAAQS. A violation occurs when the design value of the area exceeds 0.075 ppm on one or more monitors in the network over the 3 year data collection period. Implementation of contingency measures will occur within 24 months of the triggering event.

Implementation of the contingency plan involves analysis of data to determine the cause of the violation. If, after this analysis is complete, the state determines that the violation was caused by events that can be controlled within the state's jurisdiction through regulatory actions, the state will determine the appropriate measures for implementation in the area and implement such measures within the 24 month period as suggested by EPA guidance.

Determination of the appropriate contingency measure(s) for implementation will involve the following actions:

- Identification of potential sources for emission reductions;
- Identification/evaluation of prospective control measures;
- Initiation of stakeholder process; and
- Implementation of contingency measures through promulgation of appropriate control rules adhering to public notice and comment requirements.

## 8.2 CONTINGENCY MEASURES

Contingency measures to be considered for implementation will include, but will not be limited to, extending the applicability of the state's NOx control rule LAC 33:III.2202 to include the months of April and October each year. Currently, the provisions of Chapter 22 apply during the ozone season, May 1 to September 30, of each year. Reducing NOx emissions during April and October will further reduce high ozone days in the area. The state will also consider other measures deemed appropriate at the time as a result of advances in control technologies. These measures may include lowering of the NOx emission factors of LAC 33:III.2205.D and/or requiring more stringent monitoring of elevated flares.

Other possibly contingency measures that may be considered include:

- Diesel retrofit/replacement initiatives
- Programs or incentives to decrease motor vehicle use
- Implementation of fuel programs, including incentives for alternative fuels
- Employer-based transportation management plans

- Anti-backsliding ordinances
- Programs to limit or restrict vehicle use in areas of high emissions concentration during periods of peak use.

## APPENDIX A: LEGAL AUTHORITY

**Bobby Jindal**
Governor

# State of Louisiana
## Office of the Governor

February 22, 2010

Dr. Alfredo Armendariz
Regional Administrator
U.S. EPA Region 6 (6-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

RE: Designee for State Implementation Plan Purposes

Dear Dr. Armendariz:

As Governor of the State of Louisiana, I hereby appoint Peggy M. Hatch, Secretary of the Louisiana Department of Environmental Quality, as my designee to submit documents to the EPA for approval and incorporation into the State Implementation Plan for Louisiana pursuant to Section 110 of the Federal Clean Air Act and EPA's implementing regulations in 40 CFR Part 51.

Thank you for your assistance in this matter.

Sincerely,

Bobby Jindal
Governor

c: Peggy Hatch, Secretary, Louisiana Department of Environmental Quality
Thomas Diggs, Planning Section Chief, EPA

Post Office Box 94004, Baton Rouge, Louisiana 70804-9004 • (225) 342-7015 • Fax (225) 342-7099
www.gov.state.la.us

# APPENDIX B: PUBLIC NOTICE

# POTPOURRI

**Department of Environmental Quality**
**Office of Environmental Services**
**Air Permits Division**

Baton Rouge Nonattainment Area Redesignation Request and
2008 8-hour ozone National Ambient Air Quality Standard Maintenance Plan

Under the authority of the Louisiana Environmental Quality Act, R. S. 30:2001 et seq., the secretary gives notice that the Office of Environmental Services, Air Permits Division will submit a proposed Redesignation Request and Ozone Maintenance Plan for the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) for the 5-parish Baton Rouge Nonattainment Area (BRNA), which includes Ascension, East Baton Rouge, Iberville, Livingston and West Baton Rouge Parishes. The Redesignation Request is being submitted as required under Section 107(d)(3)(E) of the 1990 Clean Air Act Amendments (CAAA); the Ozone Maintenance Plan is being submitted as required under Section 175A of the 1990 CAAA.

A public hearing will be held at 1:30pm on July 29, 2015, at the Galvez Building, Oliver Pollock Conference Room located at 602 North 5th Street, Baton Rouge, Louisiana 70802. Should individuals with a disability need an accommodation in order to participate, please contact Vivian Aucoin at the number or address listed below. Interested persons are invited to attend and submit oral comments on the proposal.

All interested parties are invited to submit written comments concerning the Redesignation Request and Maintenance Plan for the Baton Rouge Area no later than 4:30 p.m., July 31, 2015 to Vivian Aucoin, Office of Environmental Services, P.O. Box 4313, Baton Rouge, LA 70821-4313, or by email to vivian.aucoin@la.gov.

A copy of the proposal may be viewed on the LDEQ website or at LDEQ headquarters at 602 North 5th Street, Baton Rouge, Louisiana 70802.

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Herman Robinson, CPM
Executive Counsel

## APPENDIX C: 2008 OZONE INFRASTRUCTURE SIP

**Bobby Jindal**
GOVERNOR

**Peggy M. Hatch**
SECRETARY

# State of Louisiana

## DEPARTMENT OF ENVIRONMENTAL QUALITY
## OFFICE OF THE SECRETARY

Mr. Ron Curry, Administrator
US EPA Region 6 (6-AR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: 2008 Ozone Infrastructure SIP

Dear Mr. Curry:

In accordance with Section 110(a)(1) and (2) of the Clean Air Act Amendments of 1990, the state of Louisiana is pleased to provide the State Implementation Plan (SIP) Infrastructure Checklist for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) along with proof of publication.

This submittal substantiates that the State has adequate provisions to prohibit air pollutant emissions from within the State that:

1.) Significantly contribute to nonattainment of the NAAQS
2.) Interfere with maintenance of the NAAQS
3.) Interfere with measures required to prevent significant deterioration of air quality; and
4.) Interfere with measures required to protect visibility in any other State.

If you or your staff have any questions concerning this submittal, please contact Ms. Tegan Treadaway, Air Permits Division, Administrator at (225) 219-3408 or Tegan.Treadaway@la.gov.

Sincerely

Peggy M. Hatch

Peggy M. Hatch
Secretary

Date: June 4, 2013

c: Guy Donaldson, EPA Region 6
Carrie Paige, EPA Region 6

Louisiana SIP Infrastructure Checklist
2008 Ozone National Ambient Air Quality Standards Revision

THE CLEAN AIR ACT
TITLE I—AIR POLLUTION PREVENTION AND CONTROL
PART A—AIR QUALITY AND EMISSION LIMITATIONS
SECTION 110—IMPLEMENTATION PLANS

Section 110(a)(1) and (2)

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| §110(a)(1) | Each State shall, after reasonable notice and public hearings, adopt and submit to the Administrator, ..., a plan which provides for implementation, maintenance, and enforcement of such primary standard in each air quality control region (or portion thereof) within such State. In addition, such State shall adopt and submit to the Administrator (either as a part of a plan submitted under the preceding sentence or separately) ..., a plan which provides for implementation, maintenance, and enforcement of such secondary standard in each air quality control region (or portion thereof) within such State. Unless a separate public hearing is provided, each State shall consider its plan implementing such secondary standard at the hearing required by the first sentence of this paragraph. | | Louisiana submitted to EPA State Implementation Plan (SIP) Revisions that dealt with the Ozone NAAQS.<br><br>A SIP revision for the "Baton Rouge Severe Area Rule Update" was submitted on June 15, 2005 and approved by EPA on July 5, 2011 (see 76 FR 38990).<br><br>Louisiana submitted (January 7, 2008) a letter to EPA certifying that the 1997 8-Hour SIP Infrastructure requirements were satisfied in accordance with Section 110(a)(1) and (2) of the CAA. EPA approved the Infrastructure elements on July 19, 2011 (see 76 FR42549).<br><br>The SIP plans: "Baton Rouge Ozone Area Redesignation Request and Maintenance"; "Baton Rouge 1997 8-Hour Moderate Reclassification"; and "Baton Rouge Nonattainment Redesignation and Maintenance Plan Technical Amendment to Section 5, Attainment Inventory and Supporting Appendix E documentation" were submitted August 31, 2010 |

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| | | | and approved by EPA on November 30, 2011 (see 76 FR 74000). |
| §110(a)(2)(A) Emission Limits and Other Control Measures | Each implementation plan submitted by a State under this Act shall be adopted by the State after reasonable notice and public hearing. Each such plan shall—include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act; | La. R.S. 30:2054; LAC 33:III Chapters 2, 5,9, 21 and 22. | Louisiana has approved and implemented rules that provide for adequate coverage of this requirement. |
| §110(a)(2)(B) Ambient Air Quality Monitoring/Data System | provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to—<br>(i) monitor, compile, and analyze data on ambient air quality, and<br>(ii)upon request, make such data available to the Administrator; | | Louisiana operates an approved air quality monitoring network consistent with EPA regulations (40 CFR 50.4).<br><br>Under LDEQ's Grant Work Plan, the department monitors, compiles, and analyzes the data for Ozone.<br><br>Currently there are twenty-four (24) Ozone monitors in the state with an additional monitor planned for Alexandria, Louisiana, with the finalization of the 2008 Ozone Standard.<br><br>Current Louisiana air quality monitoring network implements the 8-hour Ozone NAAQS. Air monitoring data can be accessed through the following websites:<br><br>http://www.deq.louisiana.gov/portal/DIVISIONS/Assessment/AirFieldServices/AmbientAirMonitoringProgram/AmbientAirMonitoringDataandReports.aspx |

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| | | | http://www.deq.louisiana.gov/portal/DIVISIONS/Assessment/AirFieldServices/AmbientAirMonitoringProgram/AirMonitoringData.aspx<br><br>LDEQ reports the air quality data to EPA on a quarterly basis. |
| §110(a)(2)(C) Program for Enforcement of Control Measures | include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D; | LAC 33:III Chapter 1, 3, 5, 7, 9, 14, 21 and 22[1] | Louisiana has approved and implemented rules that provide for adequate coverage of this requirement.<br><br>Louisiana operates an EPA-approved air permitting program for major and minor sources.<br><br>The PSD program applies to all NSR pollutants, including greenhouse gases (GHG) and $PM_{2.5}$.<br><br>The GHG rule (AQ315) was promulgated in the Louisiana Register on April 20, 2011 and submitted to EPA for approval on December 21, 2011. [2]<br><br>LDEQ revised LAC 33:III.509, Prevention of |

[1] Chapter 1 – General Provisions
Chapter 3 – Regulatory Permits
Chapter 5 – Permit Procedures
Chapter 7 –Ambient Air Quality
Chapter 9 – General Regulations on Control of Emissions and Emission Standards
Chapter 14 – Conformity
Chapter 21 – Control of Emission of Organic Compounds
Chapter 22 – Control of Emission of Nitrogen Oxides ($NO_x$)

[2] Submitted 12/21/2011. Pending EPA approval

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| | | | Significant Deterioration with substantive changes to rule AQ 328ft. The rule was finalized in the Louisiana Register on December 20, 2012 and submitted to EPA for SIP approval on February 7, 2013.[3] |
| §110(a)(2)(D) Interstate Transport | contain adequate provisions—<br>(i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will—<br>(i)(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or<br>(i)(II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,<br>(ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement); | LAC 33:III.506 | Louisiana has submitted and EPA has approved the CAIR SIPs for both SO2 and NOx for the 1997 8 Hour Ozone NAAQS Both of these SIPs meet the requirements of Sec 110(a)(2)(D). See 72 FR 39741/72 FR 55064.*<br><br>*On August 21, 2012, the U.S. Court of Appeals vacated the 2011 Cross-State Air Pollution Rule (CSAPR) and also ordered the EPA to "continue administering CAIR pending the promulgation of a valid replacement." In a November 19, 2012, Memorandum by EPA Assistant Administrator Gina McCarthy, EPA stated that CAIR emission reductions are permanent and enforceable until any "further proceedings in the CSAPR case are resolved or ... until a valid replacement rule is developed ..."<br><br>While the SIPs may be revised following the outcome of EPA's petition and/or an interstate transport rule replacement, the controls that have been installed under CAIR will remain in place in accordance with LAC 33:III. 905, which states that when air pollution control facilities have been installed on a property "they shall be used and diligently maintained in proper working order |

[3] Submitted 2/7/2013. Pending EPA approval.

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
| --- | --- | --- | --- |
| | | | whenever any emissions are being made which can be controlled by the facilities, even though the ambient air quality standards in affected areas are not exceeded."<br><br>As it relates to the 2008 8-Hour Ozone NAAQS EPA does not presently view section 110 (a)(2)(D)(i)(I) (significant contribution to nonattainment prong and interference with maintenance prong) as a "required submission" consistent with the D.C. Circuit Court's opinion in EME City Generation v. EPA, 696 F.3d7,31 (D.C. cir 2012). In that opinion, the D.C. Circuit Court concluded that a SIP submission to address Section 110(a)(2)(D)(i)(I) cannot be considered a "required" SIP submission until EPA has first quantified a state's obligation regarding transported pollutants.<br><br>Louisiana submitted a Regional Haze SIP June 13, 2008.[4] The Regional Haze SIP contains measures that will assist with reducing visibility impairment.<br><br>The PSD program applies to all NSR pollutants, including greenhouse gases (GHG) and $PM_{2.5}$.<br><br>The GHG rule (AQ315) was promulgated in the Louisiana Register on April 20, 2011 and submitted to EPA for approval on December 21, 2011.<br><br>LDEQ revised LAC 33:III.509, Prevention of Significant Deterioration with substantive changes to rule AQ 328ft. The rule was finalized in the Louisiana Register on December 20, 2012 and |

[4] Submitted 6/13/2008. Pending EPA approval.

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| | | | submitted to EPA for SIP approval on February 7, 2013. |
| §110(a)(2)(E) Adequate Resources | provide<br>(i) necessary assurances that the State (or, except where the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local governments for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or portion thereof),<br>(ii) requirements that the State comply with the requirements respecting State boards under section 128, and<br>(iii) necessary assurances that, where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision; | La. R.S. 30:2011 et seq.<br>La. R.S. 30:2014 | Louisiana works closely with the various stakeholder groups upon the announcement of new national ambient air quality standards; the LDEQ participates in an advisory capacity in the Baton Rouge Clean Air Coalition.<br><br>Louisiana has no local governmental entities that have air pollution control capacity. |

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| §110(a)(2)(F) Stationary Source Monitoring System | require, as may be prescribed by the Administrator—<br>(i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources,<br>(ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and<br>(iii) correlation of such reports by the State agency with any emission limitations or standards established pursuant to this chapter, which reports shall be available at reasonable times for public inspection; | LAC 33:III Chapter 9 | The SIP pertaining to stationary source emissions monitoring was submitted to EPA on November 15, 1994 and was approved on February 6, 1995 (60 FR 02014). The most recent revisions were submitted on September 14, 2004 and November 9, 2007 and approved on July 5, 2011 (see 76 FR 38977). This SIP revision meets the requirements set forth in §110(a)(2)(F). |
| §110(a)(2)(G) | provide for authority comparable to that in section 303 and adequate contingency plans to implement such authority; | LAC 33:III.Chapter 56 | The "Prevention of Air Pollution Emergency Episodes" provision was promulgated by LDEQ on December 20, 1987. Revisions were made to the SIP in January 1988, and approved on March 8, 1989 (54 FR 09795). |

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| §110(a)(2)(H) | provide for revision of such plan—<br>(i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and<br>(ii) except as provided in paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act; | La R.S. 30:2011, La. R.S. 30:2054 | LDEQ revises the SIP, as necessary, to comply with changes to the national ambient air quality standard or findings of inadequacies. |
| §110(a)(2)(J) | meet the applicable requirements of section 121 (relating to consultation), section 127 (relating to public notification), and part C (relating to prevention of significant deterioration of air quality and visibility protection); | LAC 33:III.509 (PSD and Visibility); LAC 33:III.531 Public Notice and Affected State Notice | Louisiana works with the Federal Land Manager on PSD projects and permits.<br><br>The PSD program applies to all NSRpollutants, including greenhouse gases (GHG) and $PM_{2.5}$.<br><br>The PSD program applies to all NSR pollutants, including greenhouse gases (GHG) and $PM_{2.5}$.<br><br>The GHG rule (AQ315) was promulgated in the Louisiana Register on April 20, 2011 and submitted to EPA for approval on December 21, 2011.<br><br>LDEQ revised LAC 33:III.509, Prevention of Significant Deterioration with substantive changes to rule AQ 328ft. The rule was finalized in the Louisiana Register on December 20, 2012 and submitted to EPA for SIP approval on February 7, 2013. |

| Federal CAA Citation | Summary of Federal Language | State Citation (if applicable) | Comments on State Language |
|---|---|---|---|
| §110(a)(2)(K) | provide for—<br>(i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard, and<br>(ii) the submission, upon request, of data related to such air quality modeling to the Administrator; | La R.S. 30:2011, La. R.S. 30:2054 | LDEQ contracts the attainment modeling requirement when necessary. Modeling was done for all nonattainment areas in the instance of Ozone as well as Regional Haze. |
| §110(a)(2)(L) | require the owner or operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover—<br>(i) the reasonable costs of reviewing and acting upon any application for such a permit, and<br>(ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the Administrator's approval of a fee program under title V; and | LAC 33:III Chapter 2 | Louisiana has an approved permit fee structure. |
| §110(a)(2)(M) | provide for consultation and participation by local political subdivisions affected by the plan. | La RS 30: 2011(D)(21)(b) | Louisiana includes these entities as part of the stakeholder group before plan implementation begins. |

# Potpourri

## POTPOURRI

### Department of Children and Family Services
### Division of Programs

Temporary Assistance to Needy Families (TANF) Caseload Reduction Report

The Department of Children and Family Services hereby gives notice that, in accordance with federal regulations at 45 CFR 261.40, the Temporary Assistance to Needy Families (TANF) Caseload Reduction Report for Louisiana is now available to the public for review and comment.

In order to receive a caseload reduction credit for minimum participation rates, the agency must submit a report based on data from the Family Independence Temporary Assistance Program (FITAP) and the Strategies to Empower People Program (STEP) containing the following information:

1. a listing of, and implementation dates for, all State and Federal eligibility changes, as defined at §261.42, made by the state after FY 2005;
2. a numerical estimate of the positive or negative impact on the applicable caseload of each eligibility change (based, as appropriate, on application denials, case closures, or other analyses);
3. an overall estimate of the total net positive or negative impact on the applicable caseload as a result of all such eligibility changes;
4. an estimate of the state's caseload reduction credit;
5. a description of the methodology and the supporting data that it used to calculate its caseload reduction estimates;
6. a certification that it has provided the public an appropriate opportunity to comment on the estimates and methodology, considered their comments, and incorporated all net reductions resulting from federal and state eligibility changes; and
7. a summary of all public comments.

Copies of the TANF Caseload Reduction Report may be obtained by writing Brandy Bonney, Department of Children and Family Services, P.O. Box 94065, Baton Rouge, LA 70804-9065, by telephone at (225) 342-4096, or via email at brandy.bonney@la.gov.

Written comments regarding the report should also be directed to Ms. Bonney. These must be received by close of business on February 19, 2013.

Suzy Sonnier
Secretary

1301#081

## POTPOURRI

### Department of Environmental Quality
### Office of the Secretary
### Legal Division

2008 Ozone ($O_3$) National Ambient Air Quality Standards (NAAQS)—State Implementation Plan (SIP) Revisions

Under the authority of the Louisiana Environmental Quality Act, R.S. 30:2051 et seq., the secretary of the Louisiana Department of Environmental Quality gives notice that the Office of Environmental Services, Air Permits Division, Manufacturing Section, will submit to the Environmental Protection Agency (EPA) a revision to the infrastructure, as required by Section 110(a)(1) and (2) of the Clean Air Act (CAA). (1301Pot1)

On March 27, 2008, EPA revised the primary and secondary Ozone NAAQS from a 1997 8-hour standard of 0.08 part per million (ppm) to a 8-hour standard of 0.075 ppm. Pursuant to Sections 110(a)(1) and (2) of the CAA, each State is required to submit a plan to provide for the implementation, maintenance and enforcement of a newly promulgated or revised NAAQS.

If any party requests a public hearing on this matter, one will be scheduled and the comments received will be submitted as an addendum to the original submittal. All interested persons are invited to submit written comments concerning the revisions no later than 4:30 p.m., February 19, 2013, to Sonya Eastern, Office of Environmental Services, P.O. Box 4313, Baton Rouge, LA 70821-4313, fax (225) 219-3474, or by email to sonya.eastern@la.gov.

A copy of the recommendation may be viewed online at the LDEQ Air Permits Engineering and Planning website or the LDEQ headquarters at 602 North Fifth Street, Baton Rouge, LA, Room 536-38.

Herman Robinson, CPM
Executive Counsel

1301#047

## POTPOURRI

### Office of the Governor
### Coastal Protection and Restoration Authority

Public Hearing—State Fiscal Year 2014 Draft Annual Plan

Pursuant to R.S. 49:213.6, the Coastal Protection and Restoration Authority of Louisiana (CPRA), will hold the following public hearings to receive comments and recommendations from the public and from elected officials

## Comment Summary Response & Concise Statement
## Louisiana SIP Infrastructure Checklist
## 2008 Ozone National Ambient Air Quality Standards Revision

Comment 1: Comment on Proposed Submittal for Infrastructure Elements (A-M)

The information provided in the proposed SIP revision is not detailed enough to substantiate that the State has adequate provisions to meet all the infrastructure requirements of Section 110(a)(2)(A-M). Infrastructure elements 110(a)(2)(C), (H) and (K) lack sufficient detail regarding citations under the Louisiana Statute and cross referencing to applicable rules.

Response 1: The department agrees with this comment. The specific citations have been added.

Comment 2: Comment Specific to Transport Elements

A SIP submission addressing CAA 110(a)(2)(D)(i)(I) is not required consistent with the court's decision. However, the information provided by LDEQ is based upon the 1997 8-hour Ozone NAAQS requirements and is not sufficient to conclude that the State's emissions do not contribute to nonattainment or interfere with maintenance of the 2008 ozone standards.

Response 2: The LDEQ agrees in part and disagrees in part. The Department disagrees and points out that the information based upon the 1997 8-hour Ozone NAAQS requirements is relevant [emphasis added] through the CAIR $NO_x$ program in that it demonstrates the Department's most recent efforts in maintaining the 8-Hour Ozone NAAQS and to alleviate transport pollutants. The Department agrees with EPA's assessment that the circumstances surrounding the D.C. Circuit court decision in EME City Generation v. EPA, 696 F.3d7,31 (D.C. cir 2012) makes it obsolete to address 110(a)(2(D(i)(I) (requirements regarding significant contribution to nonattainment and interference with maintenance). Based on the court's decision 110(a)(2(D(i)(I) is not a "required" SIP submission until EPA has defined a state's obligation regarding transport pollutants.

Comment 3: Comment Specific to Louisiana's PSD Demonstration

For an approvable infrastructure SIP, States need to have in place a comprehensive PSD program that applies to all regulated NSR pollutants, including greenhouse gases (GHGs) and $PM_{2.5}$. Please ensure that your infrastructure submittal identifies the regulatory citations for LDEQ's authority to regulate GHG consistent with federal requirements in the GHG Tailoring Rule and your authority to regulate $PM_{2.5}$ and its precursors consistent with EPA's May 16, 2008 NSR $PM_{2.5}$ Implementation Rule in the PSD program.

Response 3: The LDEQ has identified the rulemaking efforts for the adoption of the $PM_{2.5}$ PSD increment and the GHG requirements in sections 110(a)(2)(C), 110(a)(2)(D)(i)(II), and 110(a)(2)(J)(II) of the Clean Air Act. The PSD program applies to all NSR pollutants, including greenhouse gases (GHG) and $PM_{2.5}$. The GHG rule (AQ315) was promulgated in the Louisiana Register on April 20, 2011 and submitted to EPA for approval on December 21, 2011. LDEQ revised LAC 33:III.509, Prevention of Significant Deterioration with substantive changes to rule AQ 328ft. The $PM_{2.5}$ rule was finalized in the Louisiana Register on December 20, 2012 and submitted to EPA for SIP approval on February 7, 2013.

**Comment Summary Key**

Comment Nos. 1-3Guy Donaldson, Chief/EPA Air Planning Section

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

FEB 1 5 2013

Ms. Sonya Eastern
Office of Environmental Services
Louisiana Department of Environmental Quality
P.O. Box 4313
Baton Rouge, LA 70821-4313

Re: Proposed 2008 Ozone Infrastructure State Implementation Plan (SIP)

Dear Ms. Eastern:

Thank you for the opportunity to review and comment on the proposed State Implementation Plan (SIP) revision "2008 Ozone National Ambient Air Quality Standards Revision" in accordance with Section 110(a)(1) and (2) of the Clean Air Act (CAA). The Environmental Protection Agency (EPA) appreciates the efforts of the Louisiana Department of Environmental Quality (LDEQ) to meet this important CAA requirement. The EPA Region 6 offers the following comments on the proposed SIP revision:

Comment 1: Comment on Proposed Submittal for Infrastructure Elements (A-M)

The information provided in the proposed SIP revision is not detailed enough to substantiate that the State has adequate provisions to meet all the infrastructure requirements of Section 110(a)(2)(A-M) of the CAA. As a minimum, please provide state legal citations to support/document each infrastructure element you are submitting in the proposal. Infrastructure elements 110(a)(2)(C), (H) and (K) lack sufficient detail regarding citations under the Louisiana Statute and cross-referencing to applicable rules. For example, regarding section 110(a)(2)(H), LDEQ explains it revises the Louisiana SIP, as necessary, to comply with changes to the NAAQS or findings of inadequacies, yet lists "N/A" under State Citation in the proposal. As 110(a)(2)(H) requires that a state have the authority to revise the SIP as necessary, we recommend LDEQ additionally provide discussion of and reference to the State statutory authority that allows LDEQ to make the regular revisions as stated.

Regarding section 110(a)(2)(K), LDEQ states that LDEQ contracts the attainment modeling requirement when necessary and lists "N/A" under State Citation in the proposal. Section 110(a)(2)(K) requires that a state have the authority to cooperate with the Federal government and to make the submissions to the EPA. We recommend LDEQ additionally provide discussion of and reference to such authority that allows LDEQ to make the modeling submissions as stated (e.g., Revised Statutes, Title 30).

The same recommendation for additional detail applies to sections 110(a)(2)(C) in the proposal. Please include a discussion of and a more comprehensive listing of relevant rules (e.g., 33 LAC 1, 5-7,9,11,13-15 and 21-23 if appropriate) that address federal requirements in section 110(a)(2)(C).

2013 FEB 22 AM 9:42 DEQ

Additionally, please refer to our "Guidance on Infrastructure State Implementation Plan (SIP) Elements Required Under Sections 110(a)(1) and 110(a)(2) for the 2008 Lead (Pb) National Ambient Air Quality

Standards (NAAQS)." The Pb Guidance is applicable to most pollutants and addresses the infrastructure elements for SIPs to meet the requirements of CAA sections 110(a)(1) and (2).

Comment 2: Comment Specific to Transport Elements

We appreciate that your proposal attempts to address CAA 110(a)(2)(D)(i)(I) requirements regarding significant contribution to nonattainment and interference with maintenance for the 2008 ozone standards. However, in accordance with the August 21, 2012 United States Court of Appeals for the District of Columbia Circuit decision vacating the Cross-State Air Pollution Rule (CSAPR), a SIP submission addressing these requirements is not a "required" SIP submission until EPA has defined a state's obligations regarding transported pollutants. Consistent with the court decision, we did not make a finding of failure to submit SIPs addressing section 110(a)(2)(D)(i)(I) of the Clean Air Act for the 2008 ozone standards and we do not intend to make such a finding. (Please see the January 15, 2013 Federal Register notice, 78 FR 2882 and the November 19, 2012 EPA memorandum on the court decision at http://www.epa.gov/crossstaterule/pdfs/CSAPR_Memo_to_Regions.pdf).

However, if LDEQ still wishes to address the CAA 110(a)(2)(D)(i)(I) requirements, the information provided is based upon the 1997 8-hour Ozone NAAQS requirements and is not sufficient to conclude that the State's emissions do not contribute to nonattainment or interfere with maintenance of the 2008 ozone standards. Modeling and rulemaking conducted for both the Clean Air Interstate Rule (CAIR) and the CSAPR addressed the 1997 ozone standards. The modeling and rulemaking for CAIR and CSAPR did not address the 2008 ozone standards.

Comment 3: Comments Specific to Louisiana's PSD Demonstration

For an approvable infrastructure SIP, States need to have in place a comprehensive PSD program that applies to all regulated NSR pollutants, including greenhouse gases (GHGs) and $PM_{2.5}$. To assist in our review of the PSD program for infrastructure elements, please ensure that your infrastructure submittal identifies the regulatory citations for LDEQ's authority to regulate GHGs consistent with federal requirements in the GHG Tailoring Rule and your authority to regulate $PM_{2.5}$ and its precursors consistent with EPA's May 16, 2008 NSR $PM_{2.5}$ Implementation Rule in the PSD program.

The EPA finalized the $PM_{2.5}$ PSD Increment—SILs—SMC Rule (75 FR 64864, October 20, 2010) to provide additional regulatory requirements under the PSD SIP program regarding the implementation of the $PM_{2.5}$ NAAQS for NSR. As a result, the $PM_{2.5}$ PSD Increment— SILs—SMC Rule required states to submit SIP revisions to adopt the required PSD increments by July 20, 2012. This requirement applies to Louisiana. Specifically, the October 20, 2010 $PM_{2.5}$ Rule requires states to adopt and submit for EPA approval a PSD SIP revision that implements the $PM_{2.5}$ increments pursuant to section 166(a) of the CAA to prevent significant deterioration of air quality in areas meeting the NAAQS.

We recognize that on January 22, 2013 the U.S. Court of Appeals for the District of Columbia Circuit Court (Court) vacated and remanded to the EPA portions of the October 20, 2010 $PM_{2.5}$ Rule establishing PSD significant impact levels (SILs) and significant monitoring concentrations (SMCs) for $PM_{2.5}$. However, the $PM_{2.5}$ PSD increment requirements from our October 20, 2010 $PM_{2.5}$ Rule were not subject of the Court's decision and remain in place. We encourage the LDEQ to complete the rulemaking process for the adoption of the $PM_{2.5}$ increments and associated SIP submittal. Please address this rule making effort and the $PM_{2.5}$ PSD increment requirements in the proposal outlining the requirements of sections 110(a)(2)(C), 110(a)(2)(D)(i)(II), and 110(a)(2)(J))(II), of the CAA. The EPA will not be able propose a full approval of the Infrastructure SIP for the PSD related components of sections 110(a)(2)(C), 110(a)(2)(D)(i)(II), and 110(a)(2)(J) until the LDEQ submits a SIP revision addressing the $PM_{2.5}$ PSD increment requirements and the EPA approves this SIP revision.

Thank you for your efforts to meet this important CAA requirement. We offer our assistance during the SIP revision process. If you have any questions or need additional clarification, please contact Mr. John Walser of my staff at 214-665-7128. Please let us know how we may be of further assistance.

Sincerely yours,

Guy Donaldson
Chief
Air Planning Section

cc: Ms. Vivian Aucoin
Air Permits Division
Louisiana Department of
Environmental Quality

# APPENDIX D: CLEAN DATA DETERMINATION REQUEST, PROPOSAL, AND APPROVAL

## CLEAN DATA DETERMINATION REQUEST

**Bobby Jindal**
GOVERNOR

**Peggy M. Hatch**
SECRETARY

# State of Louisiana

**DEPARTMENT OF ENVIRONMENTAL QUALITY**

**OFFICE OF THE SECRETARY**

RECEIVED - 6PDL
AIR PLANNING SEC.
14 JAN 31 PM 6:08

Certified# 7004 1160 0001 9954 2315

Mr. Ron Curry, Regional Administrator
US EPA Region 6 6/RA
1445 Ross Ave, Suite 1200
Dallas TX 75202-2733

RE: Clean Data Determination for the Baton Rouge 5-Parish 2008 Ozone Nonattainment Area

Dear Mr. Curry;

I am pleased to inform you that the Baton Rouge Ozone Nonattainment Area has monitored attainment as of December 31, 2013. Based on this data, I would like to request a clean data determination ahead of the formal redesignation. The area was designated as nonattainment and classified as marginal in April 2012.

The Louisiana Department of Environmental Quality (LDEQ) submitted the ambient concentration data to your office on January 7, 2014 for certification. Once this data is certified by your office, the LDEQ will submit a request for redesignation along with all of the required elements. A copy of the data submitted is enclosed for your reference and review.

If you have any questions concerning this matter, please contact Tegan Blades Treadaway, Administrator, Air Permits Division at (225)-219-3408 or at tegan.treadaway@la.gov.

Sincerely,

Peggy M. Hatch

Peggy M. Hatch
Secretary

January 23, 2014
date

C: Thomas Diggs
Guy Donaldson

Enclosures

Post Office Box 4301 • Baton Rouge, Louisiana 70821-4301 • Phone 225-219-3953 • Fax 225-219-3971
www.deq.louisiana.gov

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

# State of Louisiana
## DEPARTMENT OF ENVIRONMENTAL QUALITY
## OFFICE OF ENVIRONMENTAL COMPLIANCE

January 7, 2014

Mr. Thomas Diggs
Associate Director for Air
USEPA Region 6-6PDQ
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Diggs:

This letter and the enclosed reports are submitted as certification that the ambient concentration data and the quality assurance data for ozone are completely submitted to AQS for the calendar year 2013.

This certifies that the data is complete and accurate to the best of our knowledge, taking into consideration the quality assurance findings. The report enclosed is the Data Certification Report AMP 600 for ozone including the P/A Quality Indicator Summary.

If you have any questions please do not hesitate to contact me at 225-219-3710.

Sincerely,

Cheryl Nolan, Assistant Secretary
Office of Environmental Compliance

Enclosures: 2013 AMP 600 (Ozone)

**cc:** Ms. Maria Martinez, EPA:6PD-Q;
Ms. Trisha Curran, EPA: 6PD-Q;
Ms. Kara Allen, EPA: 6PD-Q;

Post Office Box 4312 • Baton Rouge, Louisiana 70821-4312 • Phone 225-219-3550 • Fax 225-219-3708
www.deq.louisiana.gov

User ID: TCG

CERTIFICATION EVALUATION AND CONCURRENCE

Report Request ID: 1162731 Report Code: AMP600 Jan. 7, 2014

GEOGRAPHIC SELECTIONS

| Tribal Code | State | County | Site | Parameter | POC | City | AQCR | UAR | CBSA | CSA | EPA Region | Method | Duration | Begin Date | End Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 22 | | | | | | | | | | | | | | |

PROTOCOL SELECTIONS

| Parameter Classification | Parameter | Method | Duration |
|---|---|---|---|
| CRITERIA | 44201 | | |

AGENCY SELECTIONS

State Of Louisiana

SELECTED OPTIONS

| Option Type | Option Value |
|---|---|
| MERGE PDF FILES | YES |

GLOBAL DATES

| Start Date | End Date |
|---|---|
| 2013 | 2013 |

# Data Evaluation and Concurrence Report Summary



**Certification Year:** 2013
**Certifying Agency (CA):** State Of Louisiana (1001)

**Pollutants in Report:**

| Parameter Name | Code | Monitors Evaluated | Monitors Recommended for Concurrence by AQS | Monitors NOT Recommended for Concurrence by AQS |
|---|---|---|---|---|
| Ozone | 44201 | 24 | 24 | 0 |

**PQAOs in Report:**

| PQAO Name | PQAO Code | TSA Date |
|---|---|---|
| State Of Louisiana | 1001 | 09/13/11 |

**Summary of 'N' flags for all pollutants:**

| PQAO | Parameter Code | AQS Site-ID | POC | AQS Recommended Flag | Cert. Agency Recommended Flag | Reason for AQS Recommendation |
|---|---|---|---|---|---|---|

**Signature of Monitoring Organization Representative:** ______________________

# Data Evaluation and Concurrence Report for Gaseous Pollutants

**Certifying Year** 2013
**Certifying Agency Code** State Of Louisiana (1001)
**Parameter** Ozone (44201) (ppm)
**PQAO Name** State Of Louisiana (1001)
**QAPP Approval Date** 11/21/2012

**NPAP Audit Summary:**

| Number of Valid Audits | NPAP Bias | Criteria Met |
|---|---|---|
| 0 | | Y |

| | | | Routine Data | | | | | | One Point Quality Check | | | Annual PE | | NPAP | | | Concur. Flag | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AQS Site ID | POC | Monitor Type | Mean | Min | Max | Exceed. Count | Outlier Count | Perc. Comp. | Precision | Bias | Complete | Bias | Complete | Bias | PQAO Level Criteria | QAPP Appr. | Aqs Rec Flag | CA Rec Flag | Epa Eval. |
| 22-005-0004 | 1 | SLAMS | 0.042 | 0.005 | 0.080 | 0 | 0 | 98 | 1.58 | +/-1.28 | 100 | 0.31 | 100 | | Y | Y | Y | | |
| 22-015-0008 | 2 | SLAMS | 0.049 | 0.015 | 0.086 | 0 | 0 | 98 | 2.96 | -2.93 | 100 | - 1.36 | 100 | | Y | Y | Y | | |
| 22-017-0001 | 2 | SLAMS | 0.049 | 0.017 | 0.085 | 0 | 0 | 98 | 2.25 | +/-1.70 | 94 | 1.13 | 100 | | Y | Y | Y | | |
| 22-019-0002 | 1 | SLAMS | 0.042 | 0.009 | 0.089 | 0 | 0 | 98 | 1.54 | +/-1.30 | 100 | 10.20 | 100 | | Y | Y | Y | | |
| 22-019-0008 | 1 | SLAMS | 0.041 | 0.011 | 0.089 | 0 | 0 | 98 | 3.17 | +/-2.63 | 100 | 2.52 | 100 | | Y | Y | Y | | |
| 22-019-0009 | 1 | SPECIAL PURPOSE | 0.044 | 0.011 | 0.088 | 0 | 0 | 98 | 1.16 | +/-0.90 | 100 | 8.45 | 100 | | Y | Y | Y | | |
| 22-033-0003 | 1 | SLAMS | 0.043 | 0.002 | 0.103 | 0 | 0 | 98 | 2.17 | +/-1.82 | 100 | - 0.96 | 100 | | Y | Y | Y | | |
| 22-033-0009 | 1 | SLAMS | 0.041 | 0.005 | 0.088 | 0 | 0 | 99 | 0.95 | +/-0.66 | 100 | 10.01 | 100 | | Y | Y | Y | | |
| 22-033-0013 | 1 | SLAMS | 0.044 | 0.008 | 0.096 | 0 | 0 | 98 | 3.10 | +/-2.37 | 100 | 10.75 | 100 | | Y | Y | Y | | |
| 22-047-0009 | 1 | SLAMS | 0.041 | 0.002 | 0.104 | 0 | 0 | 99 | 1.59 | -3.02 | 100 | - 4.68 | 100 | | Y | Y | Y | | |
| 22-047-0012 | 1 | SLAMS | 0.045 | 0.006 | 0.095 | 0 | 0 | 97 | 2.84 | +/-2.38 | 96 | 1.53 | 100 | | Y | Y | Y | | |
| 22-051-1001 | 2 | SLAMS | 0.044 | 0.006 | 0.091 | 0 | 0 | 97 | 1.59 | +/-1.53 | 92 | 1.66 | 100 | | Y | Y | Y | | |
| 22-055-0007 | 1 | SLAMS | 0.044 | 0.008 | 0.083 | 0 | 0 | 98 | 1.76 | +1.82 | 100 | 3.44 | 100 | | Y | Y | Y | | |
| 22-057-0004 | 1 | SLAMS | 0.042 | 0.002 | 0.084 | 0 | 0 | 98 | 0.97 | +/-1.12 | 100 | 3.68 | 100 | | Y | Y | Y | | |
| 22-063-0002 | 1 | SPECIAL PURPOSE | 0.047 | 0.009 | 0.090 | 0 | 0 | 98 | 1.36 | +1.82 | 100 | 1.99 | 100 | | Y | Y | Y | | |
| 22-071-0012 | 2 | SLAMS | 0.041 | 0.005 | 0.089 | 0 | 0 | 95 | 1.44 | +/-1.34 | 100 | 0.49 | 100 | | Y | Y | Y | | |
| 22-073-0004 | 1 | SLAMS | 0.040 | 0.009 | 0.076 | 0 | 0 | 98 | 4.22 | +/-3.09 | 100 | -10.43 | 100 | | Y | Y | Y | | |
| 22-077-0001 | 1 | SLAMS | 0.046 | 0.014 | 0.083 | 0 | 0 | 98 | 4.31 | +/-3.76 | 100 | 1.18 | 100 | | Y | Y | Y | | |
| 22-087-0004 | 1 | SPECIAL PURPOSE | 0.044 | 0.016 | 0.079 | 0 | 0 | 95 | 2.24 | +/-2.02 | 100 | 2.72 | 100 | | Y | Y | Y | | |
| 22-089-0003 | 1 | SLAMS | 0.040 | 0.002 | 0.081 | 0 | 0 | 99 | 1.28 | +/-1.25 | 100 | 2.46 | 100 | | Y | Y | Y | | |
| 22-093-0002 | 1 | SLAMS | 0.041 | 0.009 | 0.081 | 0 | 0 | 97 | 2.58 | +/-2.43 | 100 | 0.31 | 100 | | Y | Y | Y | | |
| 22-095-0002 | 1 | SLAMS | 0.045 | 0.011 | 0.081 | 0 | 0 | 98 | 1.67 | +2.60 | 100 | - 6.82 | 100 | | Y | Y | Y | | |
| 22-103-0002 | 1 | SPECIAL PURPOSE | 0.044 | 0.002 | 0.095 | 0 | 0 | 98 | 1.43 | +/-1.33 | 100 | 2.41 | 100 | | Y | Y | Y | | |
| 22-121-0001 | 1 | SLAMS | 0.039 | 0.002 | 0.087 | 0 | 0 | 99 | 5.60 | +/-4.81 | 100 | 2.62 | 100 | | Y | Y | Y | | |

TABLE 2—BREAKPOINTS FOR THE AQI

| These breakpoints | | | | | | | Equal these AQI's | |
|---|---|---|---|---|---|---|---|---|
| $O_3$ (ppm) 8-hour | $O_3$ (ppm) 1-hour[1] | $PM_{2.5}$ ($\mu g/m^3$) 24-hour | $PM_{10}$ ($\mu g/m^3$) 24-hour | CO (ppm) 8-hour | $SO_2$ (ppb) 1-hour | $NO_2$ (ppb) 1-hour | AQI | Category |
| 0.000-0.059 | | 0.0-12.0 | 0-54 | 0.0-4.4 | 0-35 | 0-53 | 0-50 | Good. |
| 0.060-0.075 | | 12.1-35.4 | 55-154 | 4.5-9.4 | 36-75 | 54-100 | 51-100 | Moderate. |
| 0.076-0.095 | 0.125-0.164 | 35.5-55.4 | 155-254 | 9.5-12.4 | 76-185 | 101-360 | 101-150 | Unhealthy for Sensitive Groups. |
| 0.096-0.115 | 0.165-0.204 | [3]55.5-150.4 | 255-354 | 12.5-15.4 | [4]186-304 | 361-649 | 151-200 | Unhealthy. |
| 0.116-0.374 | 0.205-0.404 | [3]150.5-250.4 | 355-424 | 15.5-30.4 | [4]305-604 | 650-1249 | 201-300 | Very Unhealthy. |
| ([2]) | 0.405-0.504 | [3]250.5-350.4 | 425-504 | 30.5-40.4 | [4]605-804 | 1250-1649 | 301-400 | Hazardous. |
| ([2]) | 0.505-0.604 | [3]350.5-500.4 | 505-604 | 40.5-50.4 | [4]805-1004 | 1650-2049 | 401-500 | |

[1]Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.

[2]8-hour $O^3$ values do not define higher AQI values (≥301). AQI values of 301 or greater are calculated with 1-hour $O_3$ concentrations.

[3]If a different SHL for $PM_{2.5}$ is promulgated, these numbers will change accordingly.

[4]1-hr $SO_2$ values do not define higher AQI values (≥200). AQI values of 200 or greater are calculated with 24-hour $SO_2$ concentrations.

## PROPOSED: APPROVAL AND PROMULGATION OF AIR QUALITY IMPLEMENTATION PLANS; LOUISIANA; CLEAN DATA DETERMINATION FOR THE BATON ROUGE AREA FOR THE 2008 OZONE NATIONAL AMBIENT AIR QUALITY STANDARD (79 FR 21178)

Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the CAA; and

- does not provide EPA with the discretionary authority to address, as appropriate, disproportionate human health or environmental effects, using practicable and legally permissible methods, under Executive Order 12898 (59 FR 7629, February 16, 1994).

In addition, this proposed rule, which satisfies certain infrastructure requirements of section 110(a)(2) of the CAA for the 2010 $NO_2$ NAAQS for the State of Maryland, does not have tribal implications as specified by Executive Order 13175 (65 FR 67249, November 9, 2000), because the SIP is not approved to apply in Indian country located in the state, and EPA notes that it will not impose substantial direct costs on tribal governments or preempt tribal law.

**List of Subjects in 40 CFR Part 52**

Environmental protection, Air pollution control, Incorporation by reference, Nitrogen dioxide, Reporting and recordkeeping requirements.

**Authority:** 42 U.S.C. 7401 *et seq.*

Dated: April 4, 2014.

**W.C. Early,**

*Acting Regional Administrator, Region III.*

[FR Doc. 2014–08490 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 52

**[EPA–R07–OAR–2013–0672; FRL–9909–42–Region 7]**

### Approval and Promulgation of Implementation Plans; State of Missouri

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule.

**SUMMARY:** EPA is proposing action to approve a revision to the State Implementation Plan (SIP) submitted by the State of Missouri for the purpose of incorporating administrative changes to the Missouri rule entitled, ''Municipal Solid Waste Landfills''. EPA is proposing to approve this SIP revision based on EPA's finding that the rule is as stringent as the rule it replaces and fulfills the requirements of the Clean Air Act (CAA or Act) for the protection of the ozone National Ambient Air Quality Standards (NAAQS) in St. Louis.

**DATES:** Comments on this proposed action must be received in writing by May 15, 2014.

**ADDRESSES:** Submit your comments, identified by Docket ID No. EPA–R07–OAR–2013–0672, by mail to Craig Bernstein, Environmental Protection Agency, Air Planning and Development Branch, 11201 Renner Boulevard, Lenexa, Kansas 66219. Comments may also be submitted electronically or through hand delivery/courier by following the detailed instructions in the **ADDRESSES** section of the direct final rule located in the rules section of this **Federal Register**.

**FOR FURTHER INFORMATION CONTACT:** Craig Bernstein, Environmental Protection Agency, Air Planning and Development Branch, 11201 Renner Boulevard, Lenexa, Kansas 66219; at 913–551–7688; or by email at *Bernstein.craig@epa.gov.*

**SUPPLEMENTARY INFORMATION:** In the final rules section of this **Federal Register**, EPA is approving the state's SIP revision as a direct final rule without prior proposal because the Agency views this as a noncontroversial action and anticipates no relevant adverse comments because the revisions are administrative and consistent with Federal regulations. A detailed rationale for the approval is set forth in the direct final rule. If no relevant adverse comments are received in response to this action, no further activity is contemplated in relation to this action. If EPA receives relevant adverse comments, the direct final rule will be withdrawn and all public comments received will be addressed in a subsequent final rule based on this proposed action. EPA will not institute a second comment period on this action. Any parties interested in commenting on this action should do so at this time. Please note that if EPA receives adverse comment on part of this rule and if that part can be severed from the remainder of the rule, EPA may adopt as final those parts of the rule that are not the subject of an adverse comment. For additional information, see the direct final rule which is located in the rules section of this **Federal Register**.

Dated: April 3, 2014.

**Karl Brooks,**

*Regional Administrator, Region 7.*

[FR Doc. 2014–08339 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 52

**[EPA–R06–OAR–2014–0145; FRL–9909–52–Region 6]**

### Approval and Promulgation of Air Quality Implementation Plans; Louisiana; Clean Data Determination for the Baton Rouge Area for the 2008 Ozone National Ambient Air Quality Standard

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is proposing to find that the Baton Rouge, Louisiana marginal 2008 8-hour ozone nonattainment area is currently attaining the 2008 8-hour National Ambient Air Quality Standard (NAAQS) for ozone. This proposed clean data determination is based upon complete, quality assured, certified ambient air monitoring data that show the area has monitored attainment of the 2008 8-hour ozone NAAQS during the 2011–2013 monitoring period, and continues to monitor attainment of the NAAQS based on preliminary 2014 data.

**DATES:** Written comments should be received on or before May 15, 2014.

**ADDRESSES:** Comments may be mailed to Mr. Guy Donaldson, Chief, Air Planning Section (6PD–L), Environmental Protection Agency, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202–2733. Comments may also be submitted electronically or through hand delivery/courier by following the detailed instructions in the **ADDRESSES** section of the direct final rule located in the rules section of this **Federal Register**.

**FOR FURTHER INFORMATION CONTACT:** Ms. Ellen Belk, Air Planning Section (6PD–L); telephone (214) 665–2164; email address: *belk.ellen@epa.gov.*

**SUPPLEMENTARY INFORMATION:** In the final rules section of this **Federal Register**, EPA is approving the State's SIP submittal as a direct rule without prior proposal because the Agency views this as a noncontroversial submittal and anticipates no adverse comments. A detailed rationale for the approval is set forth in the direct final rule. If no relevant adverse comments are received in response to this action no further activity is contemplated. If EPA receives relevant adverse comments, the direct final rule will be withdrawn and all public comments received will be addressed in a subsequent final rule based on this proposed rule. EPA will not institute a second comment period. Any parties interested in commenting on this action should do so at this time.

For additional information, see the direct final rule which is located in the rules section of this **Federal Register**.

Dated: April 1, 2014.

**Samuel Coleman,**

*Acting Regional Administrator, Region 6.*

[FR Doc. 2014–08373 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 52

**[EPA–R10–OAR–2011–0715, FRL–9909–54–Region–10]**

### Approval and Promulgation of Implementation Plans; Idaho: Infrastructure Requirements for the 1997 and 2006 Fine Particulate Matter and 2008 Ozone National Ambient Air Quality Standards; Correction

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule; correction.

**SUMMARY:** On March 26, 2014, the EPA published a proposed rule finding that the Idaho State Implementation Plan (SIP) meets the infrastructure requirements of the Clean Air Act (CAA) for the National Ambient Air Quality Standards (NAAQS) promulgated for fine particulate matter ($PM_{2.5}$) on July 18, 1997 and October 17, 2006, and for ozone on March 12, 2008, in addition to the interstate transport requirements of the CAA related to prevention of significant deterioration and visibility for the 2006 $PM_{2.5}$ and 2008 ozone NAAQS. In that publication, we supplied an incorrect docket number for commenters to use when they send us comments. The correct docket number is EPA–R10–OAR–2011–0715. If commenters have already submitted comments, they need not resubmit them, because they will be routed to the correct docket.

**DATES:** Comments must be received on or before April 25, 2014.

**ADDRESSES:** Submit your comments, identified by Docket ID No. EPA–R10–OAR–2011–0715, by any of the following methods:

- *www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *Email: R10-Public_Comments@epa.gov.*
- *Mail:* Kristin Hall, EPA Region 10, Office of Air, Waste and Toxics (AWT–107), 1200 Sixth Avenue, Suite 900, Seattle WA, 98101.
- *Hand Delivery/Courier:*

**List of Subjects**

EPA Region 10 Mailroom, 9th floor, 1200 Sixth Avenue, Suite 900, Seattle WA, 98101. Attention: Kristin Hall, Office of Air, Waste and Toxics, AWT—107. Such deliveries are only accepted during normal hours of operation, and special arrangements should be made for deliveries of boxed information.

*Instructions:* Direct your comments to Docket ID No. EPA–R10–OAR–2011–0715. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information the disclosure of which is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or email. The *www.regulations.gov* Web site is an ''anonymous access'' system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through *www.regulations.gov* your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

*Docket:* All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, e.g., CBI or other information the disclosure of which is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy during normal business hours at the Office of Air, Waste and Toxics, EPA Region 10, 1200 Sixth Avenue, Seattle WA, 98101.

**FOR FURTHER INFORMATION CONTACT:** Kristin Hall at (206) 553–6357, *hall.kristin@epa.gov.*

**SUPPLEMENTARY INFORMATION:**

**Correction**

On March 26, 2014 (79 FR 16711), we, the EPA, published a proposed rule finding that the Idaho SIP meets the infrastructure requirements of the CAA for the 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, and 2008 ozone NAAQS, in addition to the interstate transport requirements of the CAA related to prevention of significant deterioration and visibility for the 2006 $PM_{2.5}$ and 2008 ozone NAAQS. In that publication, we supplied an incorrect docket number for commenters to use when they submit comments. We are publishing this notice to clarify that the correct docket number is EPA–R10–OAR–2011–0715. However, if you already submitted a comment, you need not resubmit it, because it will be routed to the correct docket. For details on the proposed rule, please see our original **Federal Register** publication at 79 FR 16711.

Dated: March 28, 2014.

**Michelle Pirzadeh,**

*Acting Regional Administrator, Region 10.*

[FR Doc. 2014–08499 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 52

**[EPA–R06–OAR–2010–0890; FRL–9909–39–Region 6]**

### Approval and Promulgation of Air Quality Implementation Plans; Texas; Control of Air Pollution From Motor Vehicles, Vehicle Inspection and Maintenance and Locally Enforced Motor Vehicle Idling Limitations

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is proposing to approve revisions to the Texas State Implementation Plan (SIP). The revisions to the Texas Administrative Code (TAC) were submitted in 2002, 2005, 2006, 2008, 2010, 2011 and 2012. These revisions are related to the implementation of the state's motor vehicle emissions Inspection and Maintenance (I/M) program and the Locally Enforced Motor Vehicle Idling Limitations. The EPA is proposing to

## DIRECT FINAL RULE: APPROVAL AND PROMULGATION OF AIR QUALITY IMPLEMENTATION PLANS; LOUISIANA; CLEAN DATA DETERMINATION FOR THE BATON ROUGE AREA FOR THE 2008 OZONE NATIONAL AMBIENT AIR QUALITY STANDARD (79 FR 21139)

methods, under Executive Order 12898 (59 FR 7629, February 16, 1994).

In addition, this rule does not have tribal implications as specified by Executive Order 13175 (65 FR 67249, November 9, 2000), because the SIP is not approved to apply in Indian country located in the state, and EPA notes that it will not impose substantial direct costs on tribal governments or preempt tribal law.

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this action and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by June 16, 2014. Filing a petition for reconsideration by the Administrator of this direct final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. Parties with objections to this direct final rule are encouraged to file a comment in response to the parallel notice of proposed rulemaking for this action published in the proposed rules section of today's **Federal Register**, rather than file an immediate petition for judicial review of this direct final rule, so that EPA can withdraw this direct final rule and address the comment in the proposed rulemaking. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

**List of Subjects in 40 CFR Part 52**

Environmental protection, Air pollution control, Incorporation by reference, Intergovernmental relations, Ozone, Particulate matter, Reporting and recordkeeping requirements, Volatile organic compounds.

Dated: April 3, 2014.

**Karl Brooks,**

*Regional Administrator, Region 7.*

Chapter I, title 40 of the Code of Federal Regulations is amended as follows:

## PART 52—[AMENDED]

■ 1. The authority citation for part 52 continues to read as follows:

**Authority:** 42 U.S.C. 7401 et seq.

## Subpart AA—Missouri

■ 2. In § 52.1320 the table in paragraph (c) is amended by revising the entry for 10–5.490 as follows:

**§ 52.1320 Identification of plan.**

* * * * *

(c) * * *

EPA-APPROVED MISSOURI REGULATIONS

| Missouri citation | Title | State effective date | EPA Approval date | Explanation |
|---|---|---|---|---|
| **Missouri Department of Natural Resources** | | | | |
| * * * * * * * | | | | |
| **Chapter 5—Air Quality Standards and Air Pollution Control Regulations for the St. Louis Metropolitan Area** | | | | |
| * * * * * * * | | | | |
| 10–5.490 | Municipal Solid Waste Landfills. | 5/30/12 | 4/15/14 *insert* FEDERAL REGISTER *page number where the document begins*]. | |
| * * * * * * * | | | | |

* * * * *

[FR Doc. 2014–08338 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

## 40 CFR Part 52

**[EPA–R06–OAR–2014–0145; FRL–9909–53–Region 6]**

## Approval and Promulgation of Air Quality Implementation Plans; Louisiana; Clean Data Determination for the Baton Rouge Area for the 2008 Ozone National Ambient Air Quality Standard

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Direct final rule.

**SUMMARY:** The Environmental Protection Agency (EPA) has determined that the Baton Rouge, Louisiana marginal 2008 8-hour ozone nonattainment area is currently attaining the 2008 8-hour National Ambient Air Quality Standard (NAAQS) for ozone. This determination is based upon complete, quality assured, certified ambient air monitoring data that show the area has monitored attainment of the 2008 8-hour ozone NAAQS during the 2011–2013 monitoring period, and continues to

monitor attainment of the NAAQS based on preliminary 2014 data.

**DATES:** This rule is effective on June 16, 2014 without further notice, unless EPA receives relevant adverse comment by May 15, 2014. If EPA receives such comment, EPA will publish a timely withdrawal in the **Federal Register** informing the public that this rule will not take effect.

**ADDRESSES:** Submit your comments, identified by Docket No. EPA–R06–OAR–2014–0145, by one of the following methods:

- *www.regulations.gov.* Follow the on-line instructions.
- Email: Mr. Guy Donaldson at *donaldson.guy@epa.gov.* Please also send a copy by email to the person listed in the **FOR FURTHER INFORMATION CONTACT** section below.
- Mail or delivery: Mr. Guy Donaldson, Chief, Air Planning Section (6PD–L), Environmental Protection Agency, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202–2733.

*Instructions:* Direct your comments to Docket ID No. EPA–R06–OAR–2014–0145. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information the disclosure of which is restricted by statute. Do not submit information through *http://www.regulations.gov* or email, if you believe that it is CBI or otherwise protected from disclosure. The *http://www.regulations.gov* Web site is an ''anonymous access'' system, which means that EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to EPA without going through *http://www.regulations.gov,* your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment along with any disk or CD–ROM submitted. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters and any form of encryption and should be free of any defects or viruses. For additional information about EPA's public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

*Docket:* The index to the docket for this action is available electronically at *www.regulations.gov* and in hard copy at EPA Region 6, 1445 Ross Avenue, Suite 700, Dallas, Texas. While all documents in the docket are listed in the index, some information may be publicly available only at the hard copy location (e.g., copyrighted material), and some may not be publicly available at either location (e.g., CBI). To inspect the hard copy materials, please schedule an appointment with the person listed in the **FOR FURTHER INFORMATION CONTACT** paragraph below or Mr. Bill Deese at 214–665–7253.

**FOR FURTHER INFORMATION CONTACT:** Ms. Ellen Belk, Air Planning Section (6PD–L), Environmental Protection Agency, Region 6, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202–2733, telephone (214) 665–2164, fax (214) 665–6762, email address *belk.ellen@epa.gov.*

**SUPPLEMENTARY INFORMATION:** Throughout this document ''we,'' ''us,'' and ''our'' refer to EPA.

**Table of Contents**

I. Background
II. EPA's Evaluation
III. Final Action
IV. Statutory and Executive Order Reviews

## I. Background

On May 21, 2012 (77 FR 30088), effective July 20, 2012, EPA designated as nonattainment any area that was violating the 2008 8-hour ozone NAAQS based on the three most recent years (2008–2010) of air quality data. The Baton Rouge area (specifically, Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes) was designated as a marginal ozone nonattainment area. Recent air quality data indicate that the Baton Rouge area is now attaining the 2008 8-hour ozone standard.

EPA is taking direct final action in determining that the Baton Rouge, Louisiana marginal 2008 8-hour ozone nonattainment area (hereafter the Baton Rouge area) has attained the 2008 8-hour NAAQS for ozone. This determination is based upon complete, quality assured and certified ambient air monitoring data that show the area has monitored attainment of the ozone NAAQS during the 2011–2013 monitoring period. Data entered into EPA's Air Quality System database (AQS) for 2014, but not yet certified also show that the area continues to attain the standard.

This clean data determination for the Baton Rouge area is being taken at the request of the State of Louisiana [1] and in accordance with our Clean Data Policy.[2] This Clean Data Determination serves as notice to the public that the nonattainment area's air quality meets the 2008 ozone NAAQS.[3]

To clarify, this action does not constitute a redesignation to attainment under CAA section 107(d)(3)(E)(i). This is because we do not yet have an approved maintenance plan for the area as required under section 175A of the CAA, nor have we found that the area has met the other applicable requirements for redesignation. The classification and designation status of the area will remain marginal nonattainment for the 2008 8-hour ozone NAAQS, and will be subject to marginal nonattainment applicable requirements including a nonattainment NSR SIP and an EI, until such time as EPA determines that the area meets all the CAA applicable requirements for redesignation to attainment. This finding means the area will have met one important requirement for redesignation, that is, having air quality that meets the standard. EPA expects that Louisiana will be providing the remaining elements necessary for redesignation in a SIP revision. Also, this action does not constitute a Determination of Attainment by an Area's Attainment Date under CAA section 179(c), 181(b)(2) and 188(b)(2).

## II. EPA's Evaluation

For ozone, an area may be considered to be attaining the 2008 8-hour ozone NAAQS if there are no violations, as determined in accordance with 40 CFR 50, based on three complete, consecutive calendar years of quality-assured air quality monitoring data. Under EPA regulations at 40 CFR Part 50, the 2008 8-hour ozone standard is

[1] See Louisiana's letter from Secretary Peggy Hatch to Mr. Ron Curry, dated January 23, 2014 in the docket for this action.

[2] Our Clean Data Policy is set forth in a May 10, 1995, EPA memorandum from John S. Seitz, Director, Office of Air Quality Planning and Standards, entitled ''Reasonable Further Progress, Attainment Demonstration, and Related Requirements for Ozone Nonattainment Areas Meeting the Ozone National Ambient Air Quality Standard.'' This policy is included in the docket for this action.

[3] See Memorandum from Janet McCabe, Deputy Assistant Administrator, Office of Air & Radiation, to Regional Administrators, Region I–X, dated April 6, 2011, entitled, ''Regional consistency for the Administrative Requirements of State Implementation Plan Submittals and the use of ''Letter Notices'', ''Attachment C—Determinations of Attainment by an Area's attainment Date v. Clean Data Determinations & Redesignation Requests and Maintenance Plans'' (p. 9) in the docket for this action.

attained when the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentrations at an ozone monitor is less than or equal to 0.075 parts per million (ppm) (i.e., 0.075 ppm, based on the truncating conventions in 40 CFR part 50, Appendix P). This 3-year average is referred to as the design value. When the design value is less than or equal to 0.075 ppm at each monitor within the area, then the area is meeting the NAAQS. Also, the data completeness requirement is met when the average percent of days with valid ambient monitoring data is greater than or equal to 90%, and no single year has less than 75% data completeness as determined in Appendix P of 40 CFR Part 50. The data must be collected and quality-assured in accordance with 40 CFR part 58, and recorded in the EPA Air Quality System (AQS). The monitors generally should have remained at the same location for the duration of the monitoring period required for demonstrating attainment. For ease of communication, many reports of ozone concentrations are given in parts per billion (ppb); ppb = ppm × 1,000. Thus, 0.075 ppm equals 75 ppb.

EPA reviewed the Baton Rouge area ozone monitoring data from ambient ozone monitoring stations for the ozone seasons 2011 through 2013, as well as data for the 2014 ozone in AQS but not yet certified. The 2011–2013 ozone season data for all the ozone monitors in the Baton Rouge area have been quality assured and certified by EPA. The design value for 2011–2013 is 0.075 ppm, and is not changed by the preliminary data for 2014 (at this time of this writing, March 7, 2014, preliminary data available in AQS included data for the month of January, 2014). The data for the three ozone seasons 2011–2013, and preliminary data for 2014, show that the Baton Rouge area is attaining the 2008 8-hour ozone NAAQS.

Table 1 shows the fourth-highest daily maximum 8-hour average ozone concentrations for the Baton Rouge, Louisiana nonattainment area monitors for the years 2011–2013. (To find the overall design value for the area for a given year, simply find the highest design value from any of the eight monitors for that year.) The location of each monitoring site in the Baton Rouge area is shown on the map entitled, ''Baton Rouge ozone and ozone precursor monitoring network'' included in the docket associated with this action.

TABLE 1—BATON ROUGE AREA FOURTH HIGH 8-HOUR OZONE AVERAGE CONCENTRATIONS AND DESIGN VALUES (PPM) [1] [2]

| Site | 4th Highest daily max | | | Design values three year averages |
|---|---|---|---|---|
| | 2011 | 2012 | 2013 | 2011–2013 |
| Plaquemine (22–047–0009) | 0.079 | 0.074 | 0.061 | 0.071 |
| Carville (22–047–0012) | 0.084 | 0.073 | 0.068 | 0.075 |
| Dutchtown (22–005–0004) | 0.080 | 0.071 | 0.062 | 0.071 |
| LSU (22–033–0003) | 0.083 | 0.075 | 0.067 | 0.075 |
| Port Allen (22–121–0001) | 0.074 | 0.070 | 0.060 | 0.068 |
| Pride (22–033–0013) | 0.075 | 0.070 | 0.062 | 0.069 |
| French Settlement (22–063–0002) | 0.077 | 0.071 | 0.069 | 0.072 |
| Capitol (22–033–0009) | 0.080 | 0.072 | 0.066 | 0.072 |

[1] Unlike for the 1-hour ozone standard, design value calculations for the 2008 8-hour ozone standard are based on a rolling three-year average of the annual 4th highest values. This is the same as design value calculations for the 1997 8-hour ozone standard. (40 CFR Part 50, Appendix I).

[2] The Baker and Grosse Tete ozone monitoring sites were shut down after 2010; no data from these sites was used in the design values included in this table.

The 8-hour ozone design value for the Baton Rouge area based on monitoring data for 2011 through 2013 is provided in Table 2:

TABLE 2—BATON ROUGE AREA 8-HOUR OZONE DESIGN VALUE (PPM)

| Baton Rouge area overall | Design value three year average |
|---|---|
| | 2011–2013 |
| | 0.075 |

As shown in Table 2, the 8-hour ozone design value for 2011–2013, which is based on a three-year average of the fourth-highest daily maximum average ozone concentration at the monitor recording the highest concentrations, is 0.075 ppm, which meets the 2008 8-hour ozone NAAQS. Data through 2013 have been quality assured, as recorded in AQS. Data for 2014 not yet certified also indicate that the area continues to attain the 2008 8-hour NAAQS. In summary, monitoring data for Baton Rouge for the three years 2011 through 2013, as well as preliminary monitoring data for 2014, show continued attainment of the 2008 8-hour ozone standard. Preliminary data for Baton Rouge for 2014 are included in the docket.

EPA's review of these data confirms that the Baton Rouge ozone nonattainment area has met and continues to meet the 2008 8-hour ozone NAAQS. Data for 2011–2013, show the area continues to attain the 2008 8-hour ozone NAAQS. Preliminary data available to date for the 2014 ozone season are consistent with continued attainment.

## III. Final Action

We are taking direct final action to find that the Baton Rouge, Louisiana marginal 2008 8-hour ozone nonattainment area has attained the 2008 8-hour NAAQS for ozone. This action is based on complete, quality assured data for 2011–2013 indicating attainment as well as on preliminary data for the 2014 ozone season available to date which are consistent with continued attainment. As provided in 40 CFR Section 51.918, this action provides formal acknowledgement that the Baton Rouge area air quality data for 2011–2013, including preliminary data for 2014, meet the applicable requirements of EPA's Clean Data Policy for the 2008 8-hour ozone standard.

EPA is publishing this rule without prior proposal because we view this as a non-controversial amendment and anticipate no adverse comments. However, in the proposed rules section of this **Federal Register** publication, we are publishing a separate document that will serve as the proposal to approve the SIP revision if relevant adverse comments are received. This rule will be effective on June 16, 2014 without further notice unless we receive relevant adverse comments by May 15, 2014. If we receive relevant adverse comments, we will publish a timely withdrawal in the **Federal Register** informing the public that the rule will not take effect. We will address all public comments in a subsequent final rule based on the proposed rule. We will not institute a second comment period on this action. Any parties interested in commenting must do so now. Please note that if we receive a relevant adverse comment on an amendment, paragraph, or section of this rule and if that provision may be severed from the remainder of the rule, we may adopt as final those provisions of the rule that are not the subject of an adverse comment.

**IV. Statutory and Executive Order Reviews**

This action makes a determination based on air quality data. For that reason, this action:

- Is not a ''significant regulatory action'' subject to review by the Office of Management and Budget under Executive Order 12866 (58 FR 51735, October 4, 1993);
- does not impose an information collection burden under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*);
- is certified as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*);
- does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4);
- does not have Federalism implications as specified in Executive Order 13132 (64 FR 43255, August 10, 1999);
- is not an economically significant regulatory action based on health or safety risks subject to Executive Order 13045 (62 FR 19885, April 23, 1997);
- is not a significant regulatory action subject to Executive Order 13211 (66 FR 28355, May 22, 2001);
- is not subject to requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the CAA; and
- does not provide EPA with the discretionary authority to address, as appropriate, disproportionate human health or environmental effects, using practicable and legally permissible methods, under Executive Order 12898 (59 FR 7629, February 16, 1994).

In addition, this rule does not have tribal implications as specified by Executive Order 13175 (65 FR 67249, November 9, 2000), because it merely makes a determination based on air quality data.

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by June 16, 2014. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

**List of Subjects in 40 CFR Part 52**

Environmental protection, Air pollution control, Ozone, Incorporation by reference.

Dated: April 1, 2014.

**Samuel Coleman,**

*Acting Regional Administrator, Region 6.*

40 CFR part 52 is amended as follows:

## PART 52—APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS

■ 1. The authority citation for part 52 continues to read as follows:

**Authority:** 42 U.S.C. 7401 *et seq.*

## Subpart T—Louisiana

■ 2. Amend § 52.977 to add a new paragraph (e) to read as follows:

**§ 52.977 Control strategy and regulations: Ozone.**

* * * * *

(e) *Clean Data Determination.* Effective June 16, 2014 EPA has determined that the Baton Rouge, Louisiana, marginal 2008 8-hour ozone nonattainment area is currently attaining the 2008 8-hour NAAQS for ozone.

[FR Doc. 2014–08369 Filed 4–14–14; 8:45 am]

BILLING CODE 6560–50–P

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## ENVIRONMENTAL PROTECTION AGENCY

## 40 CFR Part 52

**[EPA–R06–OAR–2011–0500; FRL–9909–57–Region–6]**

## Approval and Promulgation of Implementation Plans; Louisiana; Interstate Transport of Fine Particulate Matter

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Final rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is approving a portion of a State Implementation Plan (SIP) submittal, and technical supplement from the State of Louisiana to address Clean Air Act (CAA) requirements in section 110(a)(2)(D)(i)(I) that prohibit air emissions which will contribute significantly to nonattainment or interfere with maintenance in any other state for the 2006 fine particulate matter ($PM_{2.5}$) national ambient air quality standards (NAAQS). EPA has determined that the existing SIP for Louisiana contains adequate provisions to prohibit air pollutant emissions from significantly contributing to nonattainment or interfering with maintenance of the 2006 24-hour $PM_{2.5}$ NAAQS (2006 $PM_{2.5}$ NAAQS) in any other state as required by section 110(a)(2)(D)(i)(I) of the CAA.

**DATES:** This final rule is effective on May 15, 2014.

**ADDRESSES:** EPA has established a docket for this action under Docket ID No. EPA–R06–OAR–2011–0500. All documents in the docket are listed on the *http://www.regulations.gov* Web site. Although listed in the index, some information is not publicly available, e.g., Confidential Business Information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically through *http://www.regulations.gov* or in hard copy at the Air Planning Section (6PD–L),

# APPENDIX E: TECHNICAL SUPPORT DOCUMENT - PHOTOCHEMICAL MODELING FOR THE LOUISIANA 8-HOUR OZONE STATE IMPLEMENTATION PLAN

# Technical Support Document

# Photochemical Modeling for the Louisiana 8-Hour Ozone State Implementation Plan

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August 2013
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## CONTENTS


**EXECUTIVE SUMMARY ........................................................................................1**

Overview of Modeling Approach ........................................................................1

Modeled Attainment Test Results .....................................................................3

**1.0 INTRODUCTION ........................................................................................7**

1.1 Study Background ......................................................................................7

1.1.1 The Ozone NAAQS .................................................................................7

1.1.2 Recent Ozone History in Louisiana .......................................................8

1.2 Overview of Modeling Approach ...............................................................9

**2.0 EPISODE SELECTION ................................................................................12**

2.1 Decadal Trends Analysis ..........................................................................13

2.2 2008 Ozone Season ..................................................................................15

2.3 2009 Ozone Season ..................................................................................19

2.4 2010 Ozone Season ..................................................................................22

2.5 Final Consideration and Selection ............................................................26

**3.0 METEOROLOGICAL MODELING EVALUATION .............................................28**

3.1 Wind speed ..............................................................................................29

3.2 Wind Direction .........................................................................................35

3.3 Temperature .............................................................................................39

3.4 Precipitation .............................................................................................43

3.5 Summary ...................................................................................................46

**4.0 PHOTOCHEMICAL MODEL INPUTS ..........................................................47**

4.1 Meteorology ..............................................................................................47

4.2 Landuse .....................................................................................................50

4.3 Albedo-Haze-Ozone ..................................................................................55

4.4 Clear-Sky Photolysis Rates .......................................................................55

4.5 Initial and Boundary Conditions ...............................................................55

**5.0 DEVELOPMENT OF 2010 BASE YEAR EMISSIONS .......................................56**

5.1 Introduction ..............................................................................................56

5.2 Emissions in Louisiana .............................................................................56

5.2.1 Area Sources ..... 59
5.2.2 On-Road Mobile Sources ..... 60
5.2.3 Off-Road Sources ..... 67
5.2.4 Commercial Marine Vessels: Shipping Channels and Ports ..... 68
5.2.5 Port Fourchon ..... 70
5.2.6 Haynesville Shale ..... 71
5.3 Gulf Sources ..... 72
5.4 Anthropogenic Emissions Outside of Louisiana ..... 73
5.5 Biogenic Emissions ..... 74
5.5.1 MEGAN Processing ..... 74
5.5.2 BEIS Processing ..... 75
5.6 Wildland, Agricultural, and Prescribed Fires ..... 76
5.7 Summary of 2010 Louisiana Emissions ..... 76

**6.0 BASE YEAR MODEL PERFORMANCE EVALUATION ..... 82**
6.1 Overview and Context ..... 82
6.1.1 Evaluation Datasets ..... 83
6.1.2 Model Configuration ..... 83
6.2 Initial CAMx Run ..... 84
6.3 Diagnostic Sensitivity Testing (Phase 1) ..... 98
6.4 Evaluation of Ozone Precursors ..... 99
6.5 Additional Sensitivity Testing (Phase 2) ..... 107
6.6 Final Base Year CAMx Run ..... 111
6.6.1 Regional Ozone Performance ..... 121

**7.0 2017 FUTURE YEAR OZONE PROJECTION ..... 125**
7.1 Development of Future Year Emissions ..... 125
7.1.1 Emissions in Louisiana ..... 125
7.1.2 Gulf Sources ..... 130
7.1.3 Future Emissions Outside of Louisiana ..... 131
7.1.4 2017 Emissions Summary ..... 131
7.2 Ozone Modeling and Attainment Test ..... 137
7.2.1 Summary of the MATS Technique ..... 137
7.2.2 2017 DV Projection Results ..... 139
7.2.3 2017 Sensitivity Tests ..... 139

**8.0 REFERENCES .......................................................................................................146**

## TABLES

Table S-1. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV.......................................................................................5

Table 2-1. 2008 ozone observation statistics. ........................................................................18

Table 2-2. Total number of 75 ppb exceedances in 2008 by region. .......................................18

Table 2-3. 2009 ozone observation statistics. ........................................................................22

Table 2-4. Total number of 75 ppb exceedances in 2009 by region. .......................................22

Table 2-5. 2010 ozone observation statistics. ........................................................................25

Table 2-6. Total number of 75 ppb exceedances in 2010 by region. .......................................25

Table 2-7. August-October 2010 ozone observation statistics................................................25

Table 2-8. Total number of 75 ppb exceedances in August-October 2010 by region...............26

Table 2-9. Summary of the number of 75 ppb exceedances during four potential modeling periods, by region (extracted from Tables 1 through 8)......................26

Table 2-10. Summary of number of days during five potential modeling periods when daily 8-hour ozone exceeded 60, 65, 70, and 75 ppb at each monitoring site in the Baton Rouge nonattainment area...................................27

Table 4-1. CAMx and WRF vertical layer structures. ...............................................................49

Table 4-2. CAMx landuse categories for the Zhang dry deposition scheme. ............................51

Table 4-3. NALC LULC classification. .........................................................................................52

Table 4-4. LULC mapping between the 29 NALC categories and the 26 CAMx categories. ..........................................................................................................53

Table 5-1. Spatial surrogate codes developed for Louisiana emissions processing..................58

Table 5-2. Representative Louisiana parish groups for MOVES model runs............................61

Table 5-3. Spatial surrogates used in CONCEPT MV processing...............................................63

Table 5-4. Louisiana average vehicle speeds.............................................................................65

Table 5-5. Parishes assigned 7.8 RVP for episode days September 1- 15, 2010. ......................67

Table 5-6. Principal Ports Commodity Tonnage by year...........................................................69

Table 5-7. Summary of 2010 Louisiana emissions (tons/day) for typical September weekday. ..........78

Table 6-1. Phase 1 diagnostic sensitivity tests performed on the CAMx 2010 base year simulation. ..........98

Table 6-2. September and October averages of 6-9 AM observed and simulated NOx, VOC, and VOC:NOx ratio at four PAMS sites in Baton Rouge. VOC:NOx ratios are colored according to VOC-limited (blue), NOx-limited (red), and transition (purple) conditions. ..........104

Table 6-3. Phase 2 diagnostic sensitivity tests performed on the CAMx 2010 base year simulation. ..........108

Table 7-1. Louisiana 2015 CAIR Program annual NOx allocations. ..........126

Table 7-2. Louisiana Regional Labor Market Areas (RLMAs) ..........128

Table 7-3. Summary of 2017 Louisiana emissions (tons/day) for typical September weekday. ..........132

Table 7-4. Percent change in Louisiana emissions from 2010 to 2017. Empty entries indicate no emissions were reported or estimated in 2010 and 2017. ..........134

Table 7-5. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV. ..........140

Table 7-6. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection in response to an additional 30% across-the-board anthropogenic NOx reduction in Louisiana. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV. ..........142

Table 7-7. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection in response to an additional 30% across-the-board anthropogenic VOC reduction in Louisiana. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV. ..........144

## FIGURES

Figure S-1. MATS-derived 2017 DM8$O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana. ....6

Figure 1-1. Ranked monitor design values in Louisiana based on 2010-2012 measurement data. ....9

Figure 2-1. Location of ozone monitoring sites in Louisiana, color coded by region. ....13

Figure 2-2. Decadal trends (2000-2011) in site-peak and site-average annual 4th highest 8-hour ozone concentration in Baton Rouge, Lake Charles, Shreveport, and New Orleans. ....14

Figure 2-3. Decadal trends (2000-2011) in annual 4th highest 8-hour ozone concentration at five individual sites throughout Louisiana. ....15

Figure 2-4. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2008. ....16

Figure 2-5. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2008. ....17

Figure 2-6. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2009. ....20

Figure 2-7. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2009. ....21

Figure 2-8. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2010. ....23

Figure 2-9. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2010. ....24

Figure 3-1. Meteorology stations in Louisiana with the north and south sites colored in blue and red, respectively. ....28

Figure 3-2. Hourly predicted (blue) and observed (black) wind speed averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom). ....29

Figure 3-3. Hourly wind speed bias over all sites in northern Louisiana for August (top), September (middle) and October (bottom). ....30

Figure 3-4. Time series of hourly predicted (red) and observed (black) wind speeds averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom). ....31

Figure 3-5. Time series of hourly wind speed bias over all sites in southern Louisiana for August (top), September (middle) and October (bottom). .............32

Figure 3-6. Scatter plots of hourly predicted and observed wind speeds on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the 1:1 perfect correlation line; the two black dashed lines represent the ±2 m/s bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±0.5, 1, and 2 m/s. ..........................33

Figure 3-7. Soccer goal plot of daily wind speed statistics. Red circles highlight the high ozone dates. ..........................................................................................34

Figure 3-8. Hourly predicted (blue) and observed (black) wind direction averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom).............................................................................35

Figure 3-9. Hourly predicted (red) and observed (black) wind direction averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom).............................................................................36

Figure 3-10. Scatter plots of hourly predicted and observed wind direction on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the 1:1 perfect correlation line; the two black dashed lines represent the ±30 degree bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±10, 20, and 30 degrees.................37

Figure 3-11. Soccer goal plots of daily wind direction statistics. Red circles highlight the high ozone dates. ...........................................................................................38

Figure 3-12. Hourly predicted (blue) and observed (black) temperature averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom).............................................................................39

Figure 3-13. Hourly predicted (red) and observed (black) temperature averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom).............................................................................40

Figure 3-14. Scatter plots of hourly predicted and observed temperature on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the

1:1 perfect correlation line; the two black dashed lines represent the ±2 K bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±.5, 1, and 2 K. ............................................41

Figure 3-15. Soccer goal plots of daily temperature bias and error. Red circles highlight the high ozone dates. ..........................................................................42

Figure 3-16. Observed (left) and predicted (right) 24-hour precipitation ending at 6 AM CST on September 13 (top) and 14 (bottom). ..............................................43

Figure 3-17. Observed (left) and predicted (right) 24-hour precipitation ending at 6 AM CST on September 16 (top) and 17 (bottom). ..............................................44

Figure 3-18. Daily observed (left) and predicted (right) precipitation on selected episode dates (October 24, 27, and 28). .............................................................45

Figure 4-1. Map of CAMx and WRF modeling domains. ..........................................................48

Figure 4-2. Dominant landuse type in each grid cell of the 4 km CAMx domain. ....................54

Figure 5-1. Monthly temporal profiles by roadway type. .........................................................64

Figure 5-2. Day of week temporal profiles by roadway type. .................................................64

Figure 5-3. Hourly temporal profiles for all roadways on weekdays and weekends. ...............65

Figure 5-4. Louisiana on-road NO emissions (mol/h) during 8-9 AM LST September 1, 2010. ..........................................................................................................66

Figure 5-5. Louisiana on-road alkane (PAR) emissions (mol/h) during 8-9 AM LST September 1, 2010. ......................................................................................66

Figure 5-6. 24-hour commercial marine shipping NOx emissions at Louisiana deep draft ports and along RSV shipping lanes. .........................................................70

Figure 5-7. Table 2.1 from the Port Fourchon Ozone Day Port-Related Emissions Inventory Study (Starcrest and LSU, 2010). .........................................................71

Figure 5-8. Port Fourchon with 4 km grid overlay. ..................................................................71

Figure 5-9. FINN-based fire NOx emissions for September and October 2010. .......................77

Figure 5-10. Spatial distribution of total (anthropogenic and biogenic) weekday surface NOx emissions (tons/day) in 2010. ........................................................80

Figure 5-11. Spatial distribution of total weekday surface CO emissions (tons/day) in 2010. ......................................................................................................80

Figure 5-12. Spatial distribution of total (anthropogenic and biogenic) weekday surface VOC emissions (tons/day) in 2010. ........................................................81

Figure 6-1. Spatial distribution of predicted MDA8 ozone (ppb) from the initial base year run on days exceeding the 2008 ozone NAAQS in Louisiana. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). ....................................................85

Figure 6-1 (continued). ....................................................................................86

Figure 6-1 (continued). ....................................................................................87

Figure 6-1 (continued). ....................................................................................88

Figure 6-1 (concluded). ....................................................................................89

Figure 6-2. Daily statistical performance for the initial base year run at all Baton Rouge monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: maximum daily peak 1-hour observed ozone (red) and paired simulated peak at the same site (blue). Middle row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines). ....................................................................90

Figure 6-3. “Goal” plots of daily normalized bias and error from the initial base year run in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. ..................................91

Figure 6-4. “Goal” plots of daily normalized bias and error from the initial base year run in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ...............................................................91

Figure 6-5. “Goal” plots of daily normalized bias and error from the initial base year run in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ...............................................................92

Figure 6-6. “Goal” plots of daily normalized bias and error from the initial base year run in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ...............................................................92

Figure 6-7. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the LSU monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor. ..................................................94

Figure 6-8. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the LSU monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor. ..................................................94

Figure 6-9. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the Dutchtown monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor. ................................95

Figure 6-10. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the Dutchtown monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor. ...........................................95

Figure 6-11. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the Pride monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor. ................................96

Figure 6-12. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the Pride monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor. ......................................................96

Figure 6-13. WRF performance for wind direction against observations in southern Louisiana in September (left) and October (right). Figure is duplicated from Figure 3-10. ...........................................................................................97

Figure 6-14. WRF performance for temperature against observations in southern Louisiana in September (left) and October (right). Figure is duplicated from Figure 3-14. ...........................................................................................97

Figure 6-15. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 10 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 10 – Run 1) in MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right). .........................................................................................100

Figure 6-16. "Goal" plots of daily normalized bias and error from Run 10 in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. .........................................................101

Figure 6-17. "Goal" plots of daily normalized bias and error from Run 10 in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. ........................................101

Figure 6-18. "Goal" plots of daily normalized bias and error from Run 10 in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. ........................................102

Figure 6-19. "Goal" plots of daily normalized bias and error from Run 10 in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. ........................................102

Figure 6-20. Location of AQS monitoring sites in the Baton Rouge area (stars). Highlighted are four co-located PAMS sites measuring 3-hour VOC samples every few days. ........................................103

Figure 6-21. Comparison of 6-9 AM observed (blue) and simulated (red) CB05 VOCs at four PAMS sites in Baton Rouge on September 14, 2010. Plots are annotated with 6-9 AM observed/predicted NOx and VOC:NOx ratio. .............105

Figure 6-22. Comparison of 6-9 AM observed (blue) and simulated (red) relative contributions of CB05 VOCs to total VOC at four PAMS sites in Baton Rouge on September 14, 2010. ........................................105

Figure 6-23. Comparison of 6-9 AM observed (blue) and simulated (red) CB05 VOCs at four PAMS sites in Baton Rouge on October 23, 2010. Plots are annotated with 6-9 AM observed/predicted NOx and VOC:NOx ratio. .............106

Figure 6-24. Comparison of 6-9 AM observed (blue) and simulated (red) relative contributions of CB05 VOCs to total VOC at four PAMS sites in Baton Rouge on October 23, 2010. ........................................106

Figure 6-25. Midday (12-3 PM) observed and predicted (Run 10) isoprene concentrations at the Capitol PAMS site on sampling days throughout September and October 2010. ........................................108

Figure 6-26. Daily total isoprene emissions across the entire 4 km modeling grid estimated by MEGAN and BEIS for each day of August through October 2010. ........................................109

Figure 6-27. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 11 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 11 – Run 10) in MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right). ........................................110

Figure 6-28. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 15 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 15 – Run 11) in

MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right). ........ 111

Figure 6-29. Spatial distribution of predicted MDA8 ozone (ppb) from the final base year run on days exceeding the 2008 ozone NAAQS in Louisiana. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). ........ 113

Figure 6-29 (continued). ........ 114

Figure 6-29 (continued). ........ 115

Figure 6-29 (continued). ........ 116

Figure 6-29 (concluded). ........ 117

Figure 6-30. Daily statistical performance for the final base year run at all Baton Rouge monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: maximum daily peak 1-hour observed ozone (red) and paired simulated peak at the same site (blue). Middle row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines). ........ 118

Figure 6-31. "Goal" plots of daily normalized bias and error from the final base year run in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1. ........ 119

Figure 6-32. "Goal" plots of daily normalized bias and error from the final base year run in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ........ 119

Figure 6-33. "Goal" plots of daily normalized bias and error from the final base year run in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ........ 120

Figure 6-34. "Goal" plots of daily normalized bias and error from the final base year run in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days. ........ 120

Figure 6-35. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the LSU monitoring site during September (top) and October (bottom). ........ 122

Figure 6-36. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the Dutchtown monitoring site during September (top) and October (bottom). ........................................122

Figure 6-37. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the Pride monitoring site during September (top) and October (bottom). ................................................123

Figure 6-38. Locations of regional monitoring sites in areas surrounding Louisiana, relative to the CAMx modeling grid system. ....................................................123

Figure 6-39. Daily statistical performance for the final base year run at all western regional monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines). .....................................................................124

Figure 6-40. As in Figure 6-42, but at all northern regional monitoring sites. .......................124

Figure 6-41. As in Figure 6-42, but at all eastern regional monitoring sites. .........................124

Figure 7-1. Spatial distribution of 2017 total (anthropogenic and biogenic) surface NOx emissions (tons/day). ......................................................................136

Figure 7-2. Spatial distribution of 2017 total surface CO emissions (tons/day). .....................136

Figure 7-3. Spatial distribution of 2017 total (anthropogenic and biogenic) surface VOC emissions (tons/day). ......................................................................137

Figure 7-4. MATS-derived 2017 $DM8O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana. ..............................141

Figure 7-5. MATS-derived 2017 $DM8O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana; response to an additional 30% across-the-board anthropogenic NOx reduction in Louisiana. ..........................................................................................143

Figure 7-6. MATS-derived 2017 $DM8O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana; response to an additional 30% across-the-board anthropogenic VOC reduction in Louisiana. ..........................................................................................145

## EXECUTIVE SUMMARY

This Technical Support Document (TSD) describes the photochemical modeling conducted to support an attainment demonstration of the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) in the Baton Rouge nonattainment area and other areas of Louisiana. The attainment demonstration is a central component of the Louisiana State Implementation Plan (SIP) that will specifically establish strategies to attain the 2008 ozone standard. The modeling program was directed by the Louisiana Department of Environmental Quality (LDEQ), Office of Environmental Services, Air Permits Division. The technical work was conducted by the contractor team of ENVIRON International Corporation (ENVIRON) and Eastern Research Group, Inc. (ERG). The US Environmental Protection Agency (EPA), Region 6, is responsible for reviewing and approving all SIPs submitted by the State of Louisiana.

The goal of this study was to develop the photochemical modeling tools and related databases needed to reliably simulate the complex interplay between meteorology, emissions, and ambient photochemistry during a recent 8-hour ozone exceedance period in the Baton Rouge area, to project those conditions to a future year, and to evaluate emissions reductions needed to reach attainment of the current ozone NAAQS. For nonattainment areas that are classified as “moderate”, the modeled attainment demonstration must show that 8-hour ozone design values at all monitoring sites in the nonattainment area are projected to be below the 2008 standard of 75 ppb by the end of 2018.

Several EPA-accepted modeling platforms and datasets were applied to address episodic-to-seasonal meteorology, emissions, and air quality during the selected modeling period of September-October 2010. Significant effort was directed towards the inclusion of the latest Louisiana state-wide emission inventories, and the leveraging of nationwide emission databases developed by the EPA, the National Center for Atmospheric Research (NCAR), and the Bureau of Ocean Energy and Management (BOEM). A modeling protocol document was developed previously (ENVIRON and ERG, 2012) following the latest modeling guidance published by the EPA related to 8-hour ozone attainment demonstrations (EPA, 2007).

### Overview of Modeling Approach

This study has built from previous attainment demonstration modeling conducted for the same area that addressed the requirements of the 1997 ozone NAAQS, but included appropriate deviations to account for new episodes, updated datasets, new modeling tools, and other recently identified issues. For continuity, the modeling system employed many of the same emissions and photochemical model components as the previous modeling effort. However, some newer state-of-the-science components were used. The modeling system included:

- The Weather Research and Forecasting (WRF) meteorological model;
- The Emissions Processing System, version 3 (EPS3);
- The Sparse Matrix Operating Kernel Emissions (SMOKE) processor, version 3.1;

- The Consolidated Community Emissions Processing Tool (CONCEPT) combined with the EPA Motor Vehicle Emissions Simulator (MOVES) emission factor model for on-road sources;
- EPA's National Mobile Inventory Model (NMIM) for non-road sources;
- The Model of Emissions of Gases and Aerosols from Nature (MEGAN) for biogenic emissions;
- EPA's Biogenic Emissions Inventory System (BEIS);
- The Fire Inventory from NCAR (FINN) for wildfires, and agricultural/prescribed burning;
- The Comprehensive Air quality Model with extensions (CAMx).

This modeling system was employed for an extended period during September and October 2010 when elevated ozone was monitored throughout Louisiana. The modeling domain consists of a two-way interactive nested grid system employing three grids with 36, 12, and 4 km grid resolution, similarly to the previous modeling. However, the projection parameters were changed to align with the standard projection defined by the regional planning organizations (RPOs), and the 36 km grid was expanded to match the RPO continental US (CONUS) domain. This maximized portability of previously or concurrently developed emission inventories and other datasets into this project. The CAMx vertical grid structure was defined on a subset of the WRF meteorological grid structure, extending from the surface to about 11 km altitude.

Other agencies and groups contributed to the datasets employed in this study. The Louisiana Department of Transportation and Development (LDOTD) and the Capitol Region Planning Commission (CRPC) provided datasets necessary for the development of Baton Rouge and State-wide on-road emission estimates. All meteorological modeling, biogenic modeling with BEIS, and processing of EPA anthropogenic emission datasets outside of Louisiana and the Gulf of Mexico were externally performed by Alpine Geophysics, LLC (Alpine), who operated under contract to the local industry coalition.

The WRF meteorological model was supplied with several terrestrial and meteorological databases available from NCAR. Standard meteorological analyses were used to define initial/boundary conditions and to provide for analysis nudging as part of WRF's Four Dimensional Data Assimilation (FDDA) package. Meteorological modeling was conducted on the 36/12/4 km nested grid system for the duration of the modeling period. Details of the WRF configuration and application are provided in a separate report prepared by Alpine (2012). ENVIRON performed a focused evaluation of WRF's accuracy in replicating episodic weather conditions in the State of Louisiana.

Base year (2010) and projected future year (2017) model-ready emissions of ozone precursors were developed for all three modeling domains spanning the entire modeling period. The EPS3 and CONCEPT/MOVES emissions processors/models were used to translate raw stationary, non-road, and on-road emission inventories for the State of Louisiana to temporally allocated, speciated, spatially allocated input files in formats compatible with CAMx. The latest data for Louisiana stationary source emissions (from LDEQ) and on-road mobile source activity, fleet activity, and fuel parameters (from LDOTD/CRPC) were accessed. Several datasets were used to generate CAMx-ready emissions outside of Louisiana: (1) anthropogenic inventories for the US, Canada, and Mexico developed by the EPA (processed by Alpine); (2) Gulf-wide oil and gas development and commercial shipping inventories developed by the BOEM; and (3) wildland, agricultural and prescribed fire emissions developed by NCAR. The MEGAN biogenic model was initially used to generate biogenic emissions on all three modeling grids using common North American vegetative distribution datasets. In response to model performance issues indicating over predictions of isoprene leading to over predictions of ozone, we ultimately switched to biogenic emissions generated by the EPA's BEIS model (processed by Alpine Geophysics) for final base and all future year modeling. Future year projections of US emissions considered growth, emission controls already on the books, and various other factors influencing emission rates to the extent possible. Natural emissions (biogenic and fires) were held constant between the base and future year scenarios.

Ancillary photochemical modeling inputs such as initial/boundary conditions, landuse, and photolysis rates were developed using appropriate contemporary data and techniques. Chemical boundary conditions were generated from archived 2010 global modeling products from NCAR, and used for both base and future year CAMx simulations. The latest version of CAMx was run for the entire modeling period using the Carbon Bond 6 (CB6) photochemical mechanism and several new state-of-the-science algorithms. Modifications to the initial configuration were made according to the model performance evaluation process and sensitivity testing. Final base and all future year modeling employed the Carbon Bond 2005 (CB05) photochemical mechanism.

An extensive model performance evaluation of the base year modeling was conducted for ozone and precursor predictions, to the extent possible given available ambient observational data. Graphical and statistical performance was gauged for ozone, NOx, and VOC using several techniques following EPA guidance. Diagnostic and sensitivity testing were conducted to understand model sensitivity and to obtain the best performance possible for the correct reasons. Eighteen different CAMx simulations were conducted with various emission inputs, vertical mixing characterization, chemistry mechanisms and inputs, and deposition rates. These tests culminated in improved model performance in replicating measurements throughout Louisiana, with the final CAMx base year run achieving statistical benchmarks for a well-performing model.

Future year modeling was conducted for the year 2017, to establish projections one year prior to the attainment year. The EPA model attainment test procedures were utilized to determine if the future year predictions attain the 2008 8-hour ozone standard. Future emission sensitivity tests were modeled and processed through the attainment test methodology to evaluate ozone response.

## Modeled Attainment Test Results

CAMx was run for the September-October 2010 modeling period using the final base year model configuration, but exchanging the 2010 emissions with projected 2017 future year emissions. Predicted daily maximum 8-hour ozone ($DM8O_3$) concentrations throughout the September-October modeling period were extracted from the CAMx results. These modeled concentrations were supplied to the EPA Modeled Attainment Test Software (MATS) tool, which tabulated the change in $DM8O_3$ at each site, determined site-specific relative response factors (RRF) averaged over all high ozone days during the modeling period, and applied the RRFs to current design values (DV) to estimate the 2017 DV at each site. MATS was also used to perform an "unmonitored area analysis" by extrapolating site-specific future year DVs to the entire modeling grid using modeled spatial gradients to help form the resulting DV surface. Following EPA (2007) guidance, we used MATS to calculate projections from the 2010-2012 average DV.

Table S-1 presents the base year 2010-2012 average DVs at each active monitoring site in Louisiana and the corresponding 2017 future year DVs projected by MATS. Missing values in the table indicate insufficient observation data from which to calculate a valid base year DV. All DVs are projected to be below the 75 ppb ozone NAAQS in 2017.

Figure S-1 displays the 2017 unmonitored area calculation (projected from the 2010-2012 average DV) for the portion of the 4 km grid covering the State of Louisiana. DVs are projected to be below the 75 ppb NAAQS throughout the State. Areas contoured in white show locations where DVs are either estimated to be below 40 ppb, or are missing because they could not be extrapolated by MATS.

Two emission sensitivity tests were run for the 2017 future year to quantify effects from simple across-the-board reductions in Louisiana anthropogenic NOx and VOC emissions. An arbitrary reduction of 30% was applied first to NOx (no change to VOC) and then to VOC (no change to NOx). All 2017 model-ready anthropogenic emissions in grid cells covering the State were scaled downward, including all low-level (gridded) sources and point sources. Emissions outside the State were not affected, nor were biogenic and fire sources throughout the 4 km grid.

These sensitivity tests indicated further ozone reductions by up to 10 ppb throughout the State. While both NOx and VOC reductions are shown to be effective in reducing ozone throughout the State, ozone tends to be somewhat more responsive to NOx reductions by typically 2-3 ppb. This effect could be more quantitatively analyzed through the use of CAMx probing tools, such as the Ozone Source Apportionment Tool (OSAT) or the Decoupled Direct Method (DDM) of sensitivity analysis.

**Table S-1. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV.**

| | | Base Year | Future Year |
|---|---|---|---|
| AIRS Site ID | Parish | 2010-12 DV | 2017 DV |
| 220050004 | Ascension | 76 | 70 |
| 220110002 | Beauregard | | |
| 220150008 | Bossier | 77 | 68 |
| 220170001 | Caddo | 74 | 70 |
| 220190002 | Calcasieu | 74 | 68 |
| 220190008 | Calcasieu | 66 | 61 |
| 220190009 | Calcasieu | 73 | 67 |
| 220330003 | E Baton Rouge | 79 | 73 |
| 220330009 | E Baton Rouge | 75 | 69 |
| 220330013 | E Baton Rouge | 72 | 66 |
| 220331001 | E Baton Rouge | 72 | 66 |
| 220430001 | Grant | | |
| 220470007 | Iberville | 71 | 64 |
| 220470009 | Iberville | 74 | 67 |
| 220470012 | Iberville | 75 | 68 |
| 220511001 | Jefferson | 75 | 68 |
| 220550005 | Lafayette | | |
| 220550007 | Lafayette | 72 | 64 |
| 220570004 | Lafourche | 72 | 66 |
| 220630002 | Livingston | 75 | 69 |
| 220710012 | Orleans | 70 | 63 |
| 220730004 | Ouachita | 64 | 58 |
| 220770001 | Pointe Coupee | 75 | 70 |
| 220870002 | St. Bernard | | |
| 220870009 | St. Bernard | 69 | 63 |
| 220890003 | St. Charles | 71 | 65 |
| 220930002 | St. James | 68 | 64 |
| 220950002 | St. J. Baptist | 74 | 69 |
| 221010003 | St. Mary | | |
| 221030002 | St. Tammany | 74 | 65 |
| 221210001 | W Baton Rouge | 71 | 65 |

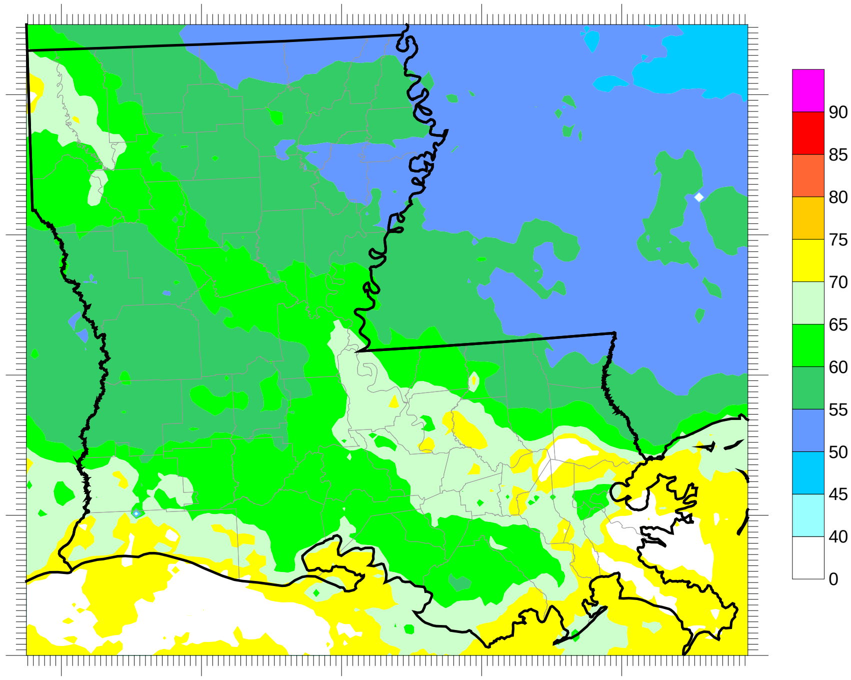



**Figure S-1. MATS-derived 2017 DM8$O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana.**

# 1.0 INTRODUCTION

This Technical Support Document (TSD) describes the photochemical modeling conducted to support an attainment demonstration of the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) in the Baton Rouge nonattainment area and other areas of Louisiana. The attainment demonstration is a central component of the Louisiana State Implementation Plan (SIP) that will specifically establish strategies to attain the 2008 ozone standard. The modeling program was directed by the Louisiana Department of Environmental Quality (LDEQ), Office of Environmental Services, Air Permits Division. The technical work was conducted by the contractor team of ENVIRON International Corporation (ENVIRON) and Eastern Research Group, Inc. (ERG). The US Environmental Protection Agency (EPA), Region 6, is responsible for reviewing and approving all SIPs submitted by the State of Louisiana.

The goal of this study was to develop the photochemical modeling tools and related databases needed to reliably simulate the complex interplay between meteorology, emissions, and ambient photochemistry during a recent 8-hour ozone exceedance period in the Baton Rouge area, to project those conditions to a future year, and to evaluate emissions reductions needed to reach attainment of the current ozone NAAQS. For nonattainment areas that are classified as “moderate”, the modeled attainment demonstration must show that 8-hour ozone design values at all monitoring sites in the nonattainment area are projected to be below the 2008 standard of 75 ppb by the end of 2018.

Several EPA-accepted modeling platforms and datasets were applied to address episodic-to-seasonal meteorology, emissions, and air quality during the selected modeling period of September-October 2010. Significant effort was directed towards the inclusion of the latest Louisiana state-wide emission inventories, and the leveraging of nationwide emission databases developed by the EPA, the National Center for Atmospheric Research (NCAR), and the Bureau of Ocean Energy and Management (BOEM). A modeling protocol document was developed previously (ENVIRON and ERG, 2012) following the latest modeling guidance published by the EPA related to 8-hour ozone attainment demonstrations (EPA, 2007).

## 1.1 Study Background

### 1.1.1 The Ozone NAAQS

The EPA is required to consider revisions to the NAAQS every five years. The standard for each criteria pollutant comprises a primary value designed to protect public health, and a secondary value designed to protect public welfare. EPA promulgated the first 8-hour ozone NAAQS in 1997. The form of the standard is the three year running average of the annual fourth highest daily maximum 8-hour ozone concentration. This form establishes the yearly ozone “design value” (DV) for each individual monitor in the State. Design values exceeding the standard at any monitor result in a nonattainment designation for the area; the degree to which a monitor exceeds the standard determines the area’s classification (e.g., Marginal, Moderate, Serious, Severe, or Extreme). The 1997 primary and secondary 8-hour ozone standards were set at 0.08 ppm.

In March 2008, EPA lowered the 8-hour primary and secondary ozone NAAQS to 0.075 ppm. In January 2010, EPA announced that they were reconsidering a further reduction of the 2008 primary standard to within 0.060 – 0.070 ppm, while instituting a new secondary standard in the form of a seasonal (3 month) accumulation of ozone during daylight hours (8 AM – 8 PM) within 7-15 ppm-hrs. In September 2011, the Obama Administration directed EPA to withdraw the reconsideration and so the 2008 8-hour primary and secondary ozone NAAQS remains at 0.075 ppm.

The implementation schedule for the 2008 NAAQS calls for nonattainment area designations by mid-2012 based on monitoring data recorded in 2008-2010. The attainment year for marginal areas (Louisiana's highest nonattainment classification) is 2015. Marginal areas are not required to conduct modeling to demonstrate attainment, since EPA expects these areas to be able to attain the ozone NAAQS within three years of designation. During this time EPA is continuing to develop and implement federal rules that will reduce emissions from utilities, mobile sources, oil and gas source, and boilers/incinerators throughout the US. However, if nonattainment areas do not attain the ozone NAAQS by 2015 they will be bumped up to the moderate classification. In that case, modeling must be performed to demonstrate attainment by 2018.

In 2010 EPA initiated their next round of ozone NAAQS review. This is expected to result in a proposed new set of ozone NAAQS in 2014: a primary 8-hour ozone standard in the range of 0.060 – 0.070 ppm; and a secondary seasonal accumulated ozone standard of 7-15 ppm-hrs.

### 1.1.2 Recent Ozone History in Louisiana

Based on measured ozone data from 2001-2003, the EPA designated the five parishes comprising greater Baton Rouge (East Baton Rouge, West Baton Rouge, Livingston, Ascension, and Iberville) as a Marginal nonattainment area according to the 1997 8-hour ozone NAAQS. However, Baton Rouge experienced high ozone conditions as late as 2006 and therefore did not attain the 1997 standard by the Marginal attainment date of June 15, 2007. In response, EPA reclassified Baton Rouge as a Moderate nonattainment area with an attainment date of June 15, 2010.

Between 2007-2009, the LDEQ and its contractors developed a photochemical modeling system to support the attainment demonstration for the Baton Rouge Moderate-area ozone SIP. This modeling and related corroborative analyses showed that the area would reach attainment of the 1997 standard by the 2010 attainment date. Monitoring in Baton Rouge since 2006 has exhibited no exceedances of the 1997 standard, and thus in 2010 the LDEQ submitted an attainment reclassification request and maintenance plan to EPA Region 6 that included a TSD detailing the modeling demonstration (ENVIRON and ERG, 2009). On November 30, 2011, EPA took final action to redesignate Baton Rouge to attainment of the 1997 standard (Federal Register, 2011).

Based on a recent three year period of measured ozone data from 2008-2010, which constitutes the official period from which EPA has designated final nonattainment areas, only one parish (East Baton Rouge) exceeded the 2008 standard of 75 ppb at the Marginal level (out of 18 monitored parishes in Louisiana). Figure 1-1 shows ranked design values from the most recent official three year data period (2010-2012).

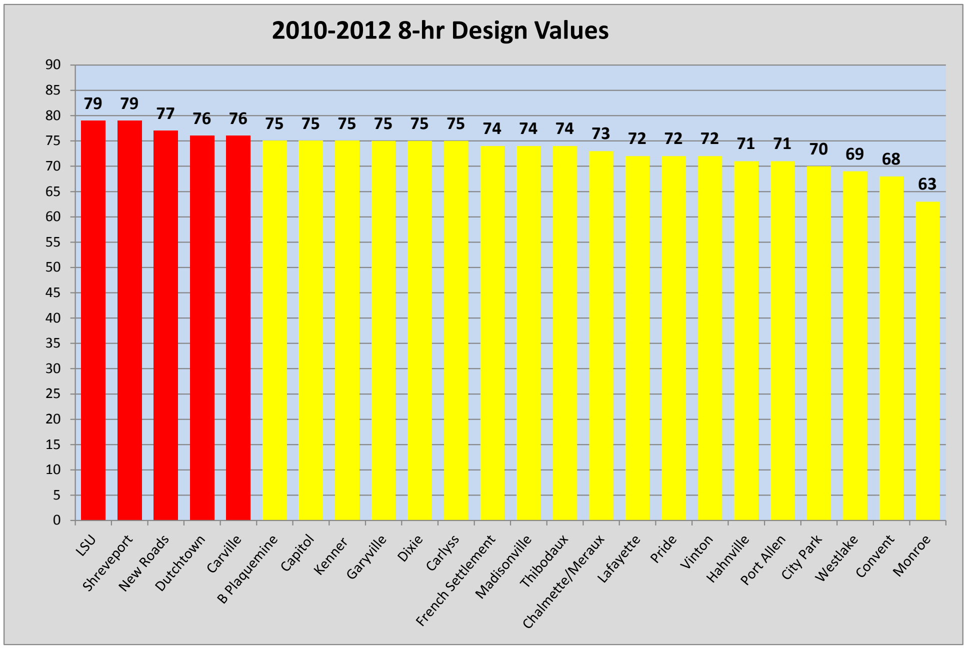



**Figure 1-1. Ranked monitor design values in Louisiana based on 2010-2012 measurement data.**

## 1.2 Overview of Modeling Approach

The goal of this study was to develop the photochemical modeling data bases and associated analysis tools needed to reliably simulate the processes responsible for ozone exceedances in the Baton Rouge nonattainment area and other areas throughout the State. It will culminate in the ozone attainment demonstration for the next 8-hour ozone SIP due in 2015. This study has built from previous attainment demonstration modeling conducted for the same area that addressed the requirements of the 1997 standard, but with appropriate deviations to account for new episodes, updated datasets, new modeling tools, and other recently identified issues.

The ENVIRON/ERG modeling team developed a Modeling Protocol document detailing the data, models, configurations, and analysis techniques to be employed in this project (ENVIRON and ERG, 2012). In particular, the Protocol outlined the rationale for model selection and grid configuration, and established the procedures for episode selection; such information is not repeated in this TSD. This section summarizes the technical approach and later chapters of this TSD provide further details.

For continuity, the modeling system employed many of the same emissions and photochemical model components documented in the 2009 TSD. However, some newer state-of-the-science components were used. The modeling system included:

- The Weather Research and Forecasting (WRF) meteorological model;
- The Emissions Processing System, version 3 (EPS3);
- The Sparse Matrix Operating Kernel Emissions (SMOKE) processor, version 3.1;
- The Consolidated Community Emissions Processing Tool (CONCEPT) combined with the EPA Motor Vehicle Emissions Simulator (MOVES) emission factor model for on-road sources;
- EPA's National Mobile Inventory Model (NMIM) for non-road sources;
- The Model of Emissions of Gases and Aerosols from Nature (MEGAN) for biogenic emissions;
- EPA's Biogenic Emissions Inventory System (BEIS);
- The Fire Inventory from NCAR (FINN) for wildfires, and agricultural/prescribed burning;
- The Comprehensive Air quality Model with extensions (CAMx).

This modeling system was employed for an extended period during September and October 2010 when elevated ozone was monitored throughout Louisiana. The modeling domain consists of a two-way interactive nested grid system employing three grids with 36, 12, and 4 km grid resolution, similarly to the previous modeling. However, the projection parameters were changed to align with the standard projection defined by the regional planning organizations (RPOs), and the 36 km grid was expanded to match the RPO continental US (CONUS) domain. This maximized portability of previously or concurrently developed emission inventories and other datasets into this project. The CAMx vertical grid structure was defined on a subset of the WRF meteorological grid structure, extending from the surface to about 11 km altitude.

Other agencies and groups contributed to the datasets employed in this study. The Louisiana Department of Transportation and Development (LDOTD) and the Capitol Region Planning Commission (CRPC) provided datasets necessary for the development of Baton Rouge and State-wide on-road emission estimates. All meteorological modeling, biogenic modeling with BEIS, and processing of EPA anthropogenic emission datasets outside of Louisiana and the Gulf of Mexico were externally performed by Alpine Geophysics, LLC (Alpine), who operated under contract to the local industry coalition.

The WRF meteorological model was supplied with several terrestrial and meteorological databases available from NCAR. Standard meteorological analyses were used to define initial/boundary conditions and to provide for analysis nudging as part of WRF's Four Dimensional Data Assimilation (FDDA) package. Meteorological modeling was conducted on the 36/12/4 km nested grid system for the duration of the modeling period. Details of the WRF configuration and application are provided in a separate report prepared by Alpine (2012).

ENVIRON performed a focused evaluation of WRF's accuracy in replicating episodic weather conditions in the State of Louisiana.

Base year (2010) and projected future year (2017) model-ready emissions of ozone precursors were developed for all three modeling domains spanning the entire modeling period. The EPS3 and CONCEPT/MOVES emissions processors/models were used to translate raw stationary, non-road, and on-road emission inventories for the State of Louisiana to temporally allocated, speciated, spatially allocated input files in formats compatible with CAMx. The latest data for Louisiana stationary source emissions (from LDEQ) and on-road mobile source activity, fleet activity, and fuel parameters (from LDOTD/CRPC) were accessed. Several datasets were used to generate CAMx-ready emissions outside of Louisiana: (1) anthropogenic inventories for the US, Canada, and Mexico developed by the EPA (processed by Alpine); (2) Gulf-wide oil and gas development and commercial shipping inventories developed by the BOEM; and (3) wildland, agricultural and prescribed fire emissions developed by NCAR. The MEGAN biogenic model was initially used to generate biogenic emissions on all three modeling grids using common North American vegetative distribution datasets. In response to model performance issues indicating over predictions of isoprene, we ultimately switched to biogenic emissions generated by the EPA's BEIS model (processed by Alpine Geophysics) for final base and all future year modeling. Future year projections of US emissions considered growth, emission controls already on the books, and various other factors influencing emission rates to the extent possible. Natural emissions were held constant between the base and future year scenarios.

Ancillary photochemical modeling inputs such as initial/boundary conditions, landuse, and photolysis rates were developed using appropriate contemporary data and techniques. Chemical boundary conditions were generated from archived 2010 global modeling products from NCAR, and used for both base and future year CAMx simulations.. The latest version of CAMx was run for the entire modeling period using the Carbon Bond 6 (CB6) photochemical mechanism and several new state-of-the-science algorithms. Modifications to the initial configuration were made according to the model performance evaluation process and sensitivity testing. Final base and all future year modeling employed the Carbon Bond 2005 (CB05) photochemical mechanism.

An extensive model performance evaluation of the base year modeling was conducted for ozone and precursor predictions, to the extent possible given available ambient observational data. Graphical and statistical performance was gauged using several techniques following EPA guidance. Diagnostic and sensitivity testing were conducted to understand model sensitivity and to obtain the best performance possible for the correct reasons.

Future year modeling was conducted for the year 2017, to establish projections one year prior to the attainment year. The EPA model attainment test procedures were utilized to determine if the future year predictions attain the 2008 8-hour ozone standard. Future emission sensitivity tests were modeled and processed through the attainment test methodology to evaluate ozone response.

## 2.0 EPISODE SELECTION

This section presents an evaluation of statewide ozone data between 2008 and 2010 from which to select a representative episode for photochemical modeling. Figure 2-1 shows the locations of the 26 observation sites in Louisiana, color-coded by region.

EPA (2007) has identified four primary episode selection criteria when choosing an episode for ozone SIP modeling:

- A variety of meteorological conditions should be covered, especially the types of meteorological conditions that produce 8-hour ozone exceedances in the area of interest;
- Choose episodes having days with monitored 8-hour daily maximum ozone concentrations close to the monitors' design values (DV);
- To the extent possible, the modeling database should include days for which extensive measurement data (i.e. beyond routine aerometric and emissions monitoring) are available; and
- Sufficient days should be available such that relative response factors (RRF) can be based on several (i.e., > 10) days, with at least 5 days being the absolute minimum.

Four secondary criteria should also be considered:

- Choose periods that have already been modeled;
- Choose periods that are drawn from the years upon which the current design values are based;
- Include weekend days among those chosen; and
- Choose modeling periods that meet as many episode selection criteria as possible in the maximum number of nonattainment areas as possible.

Ozone data were examined for three ozone seasons (April to October) between 2008 and 2010, from which new ozone attainment designations were established by EPA. If an entire ozone season were modeled, all of the criteria should be fulfilled as long as the season contained several 8-hour ozone exceedance events. The following conditions were considered to select the best period to model:

- The period from which the nonattainment designations are defined;
- A large number of exceedance days at all (or most) monitoring locations;
- A representative (non-extreme) spectrum of meteorological conditions that represent a range of transport patterns, high ozone periods, and clean out days;
- A representative (usual) pattern of anthropogenic activities not impacted by major planned or accidental events that effect population, traffic, or industrial/commercial activity.

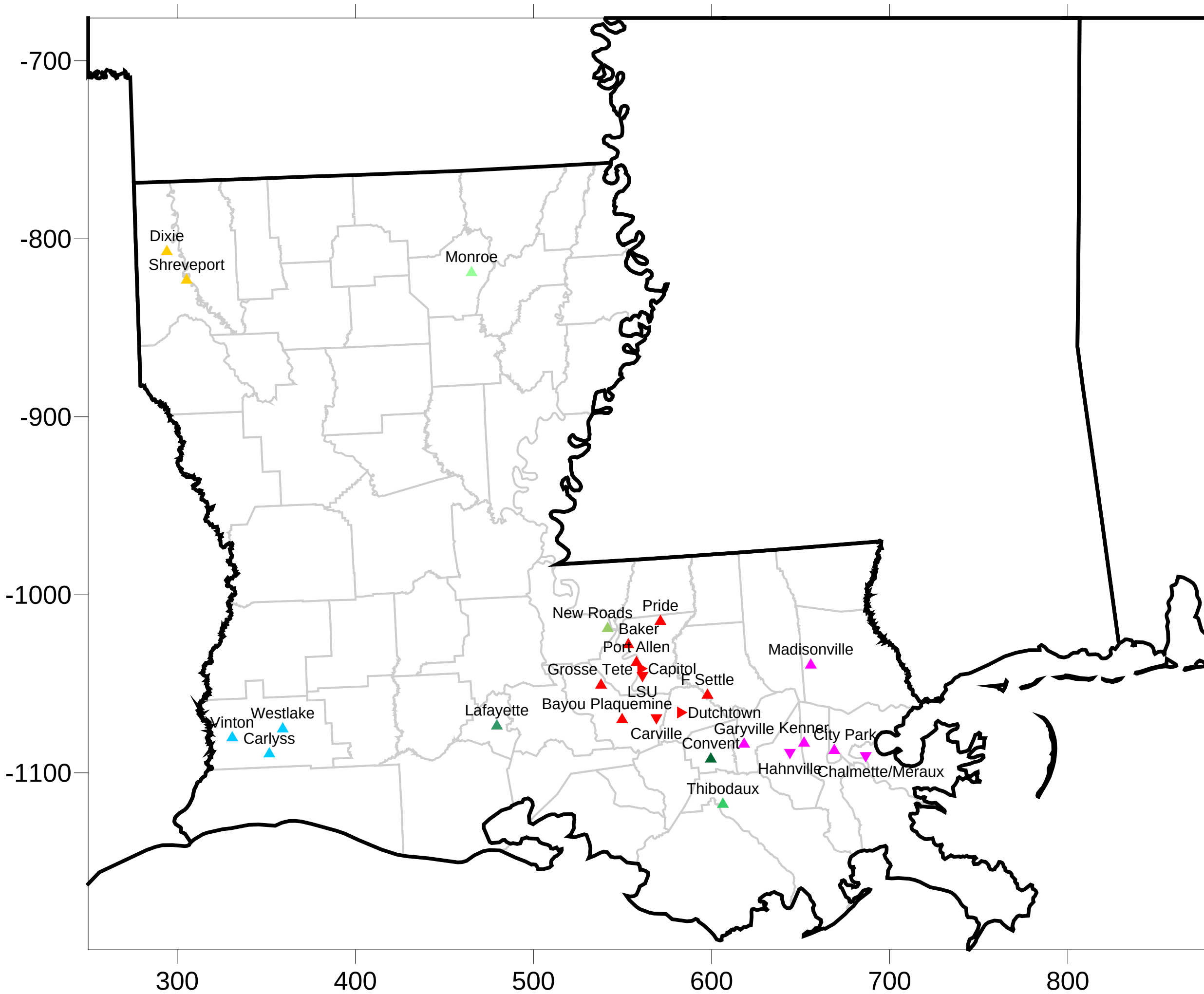



**Figure 2-1. Location of ozone monitoring sites in Louisiana, color coded by region.**

## 2.1 Decadal Trends Analysis

Figure 2-2 presents the 2000-2011 trends in annual 4th highest 8-hour ozone in the four regions of Louisiana with multiple monitoring sites (Baton Rouge, New Orleans, Shreveport, and Lake Charles). The figures present the trends for the peak site and for an average over all sites; a simple linear regression fit is also shown for both. In all four regions, the 4th highest ozone is trending downward at rates between -0.5 ppb/year (Shreveport) and -1.3 ppb/year (Baton Rouge). However, the most recent years show an uptick in peak ozone concentrations that reduce the gains seen between 2000 and 2008, especially in Shreveport.

Similar plots are shown in Figure 2-3, but for regions with just a single monitoring site. Four of five of these sites show similar and generally stronger downward trends, ranging from -0.8 ppb/year (Convent) to -1.7 ppb/year (Monroe). The site “New Roads” suggests a positive trend in peak ozone. Given that this site is just north of Baton Rouge (usually a downwind direction

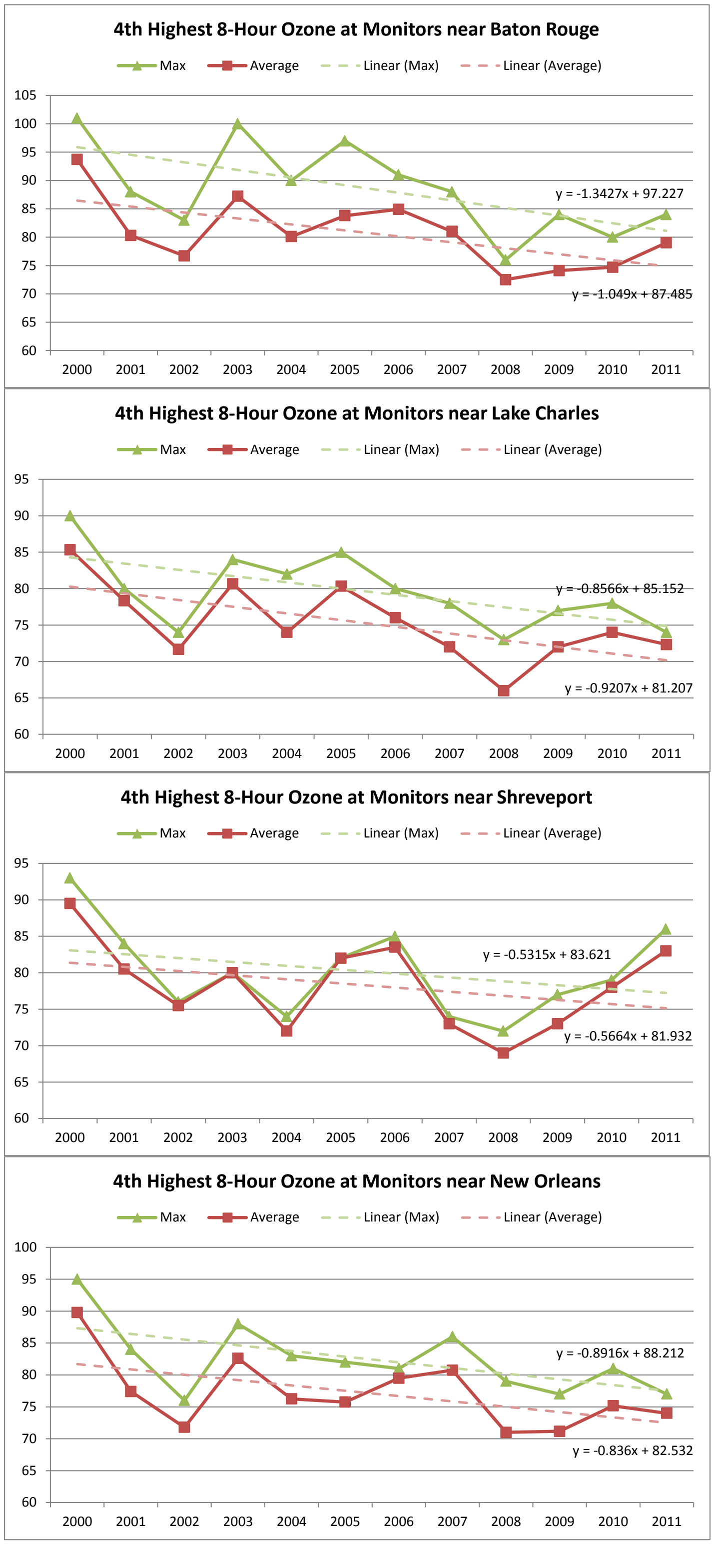


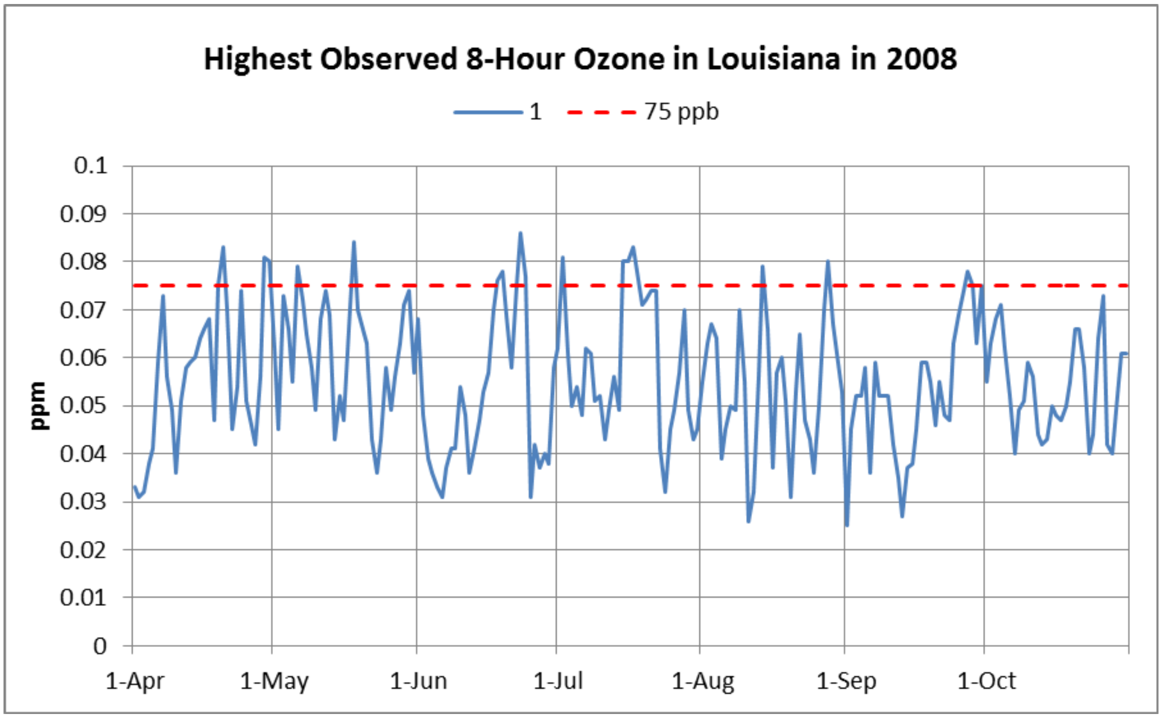

**Figure 2-2. Decadal trends (2000-2011) in site-peak and site-average annual 4th highest 8-hour ozone concentration in Baton Rouge, Lake Charles, Shreveport, and New Orleans.**


**Figure 2-3. Decadal trends (2000-2011) in annual 4th highest 8-hour ozone concentration at five individual sites throughout Louisiana.**

according to ozone episode climatology), it is possible that this site is measuring an increase in downwind ozone production from precursors originating in Baton Rouge. Larger reductions of industrial VOC emissions relative to urban NOx emissions would serve to slow urban ozone production, reduce peak ozone concentrations near Baton Rouge, and raise peak concentrations downwind.

## 2.2 2008 Ozone Season

In 2008 there were 24 active ozone monitors across Louisiana. Two time series are shown in Figure 2-4. The top displays the highest daily observed 8-hour ozone at any monitor in Louisiana for each date from April to October 2008. The dashed red line at 75 ppb denotes the current 8-hour ozone standard. The bottom plot shows the number of monitoring sites measuring at least 75, 70, 65, and 60 ppb on each date. Figure 2-5 shows similar time series for just the monitors in Baton Rouge. Table 2-1 summarizes the number of days and site-days when 8-hour ozone was above the same four thresholds throughout Louisiana and specifically



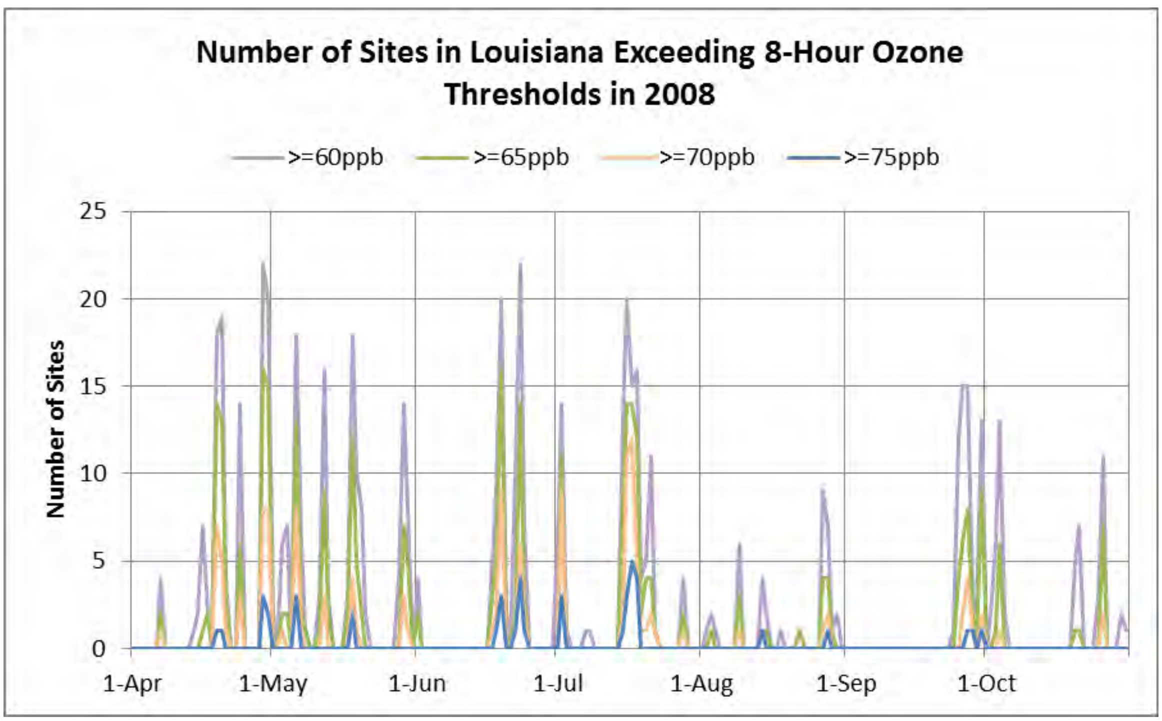
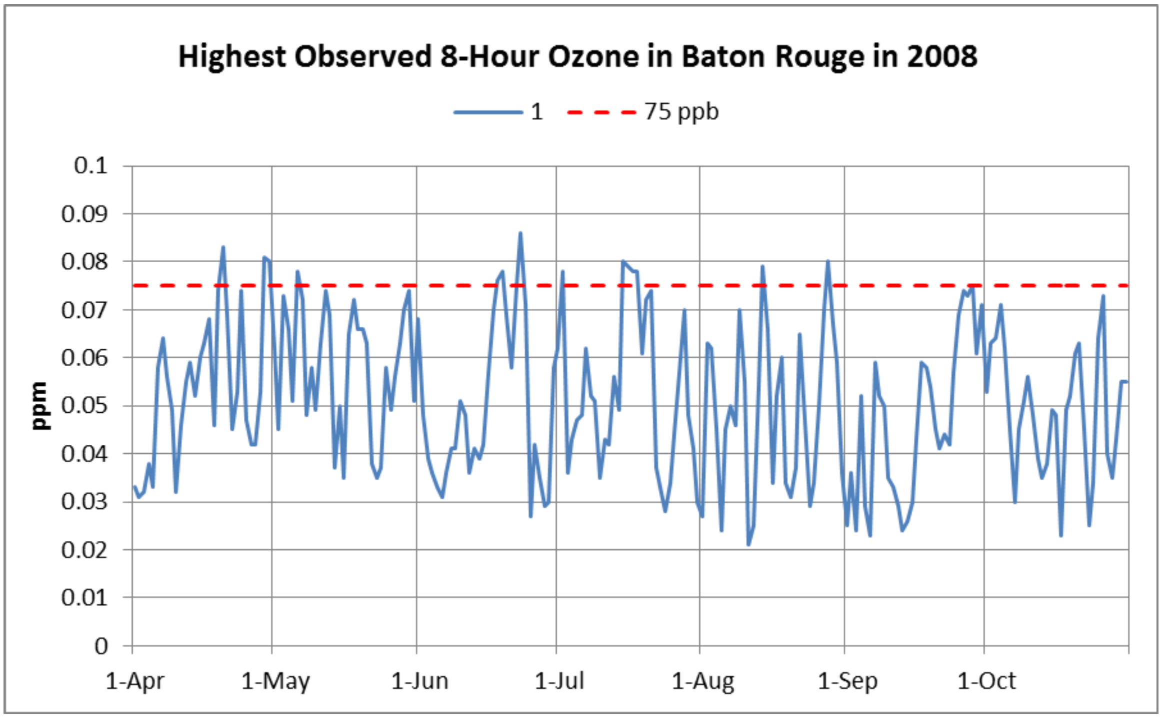




**Figure 2-4. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2008.**



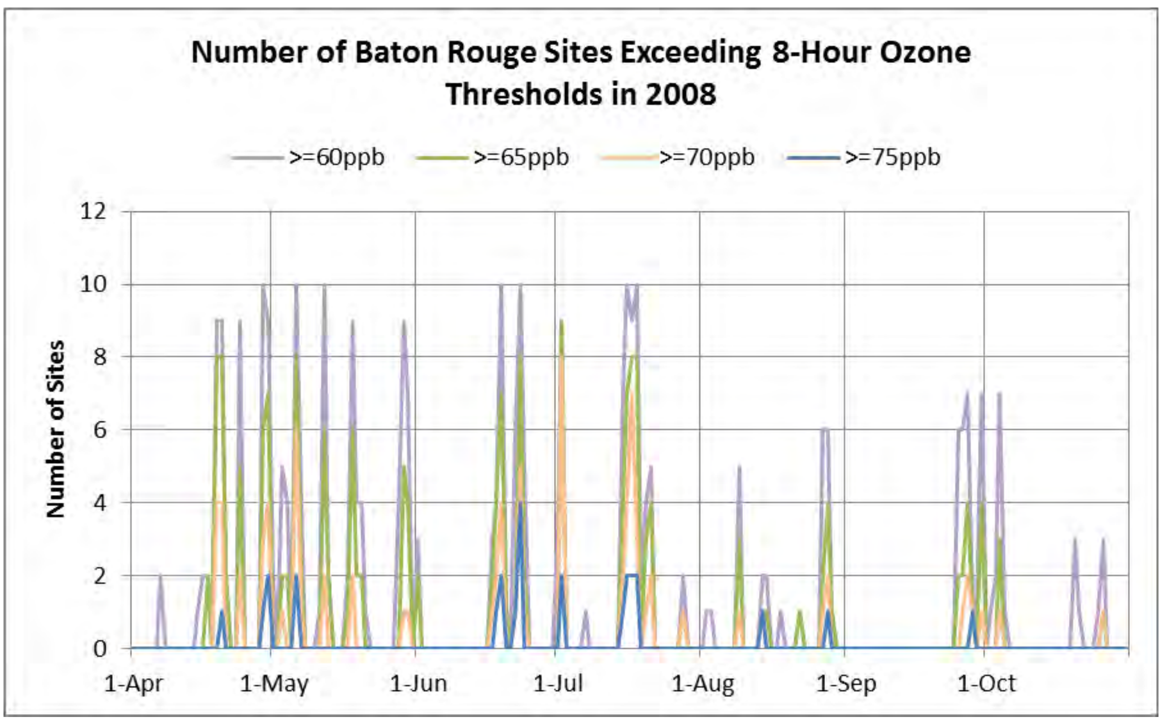




**Figure 2-5. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2008.**

**Table 2-1. 2008 ozone observation statistics.**

| | All Louisiana monitors | | Baton Rouge monitors | |
|---|---|---|---|---|
| Ozone threshold (ppb) | Number of days | Number of site-days | Number of days | Number of site-days |
| ≥ 75 ppb | 21 | 43 | 16 | 26 |
| ≥ 70 ppb | 41 | 138 | 36 | 85 |
| ≥ 65 ppb | 59 | 316 | 49 | 181 |
| ≥ 60 ppb | 79 | 583 | 69 | 310 |

in Baton Rouge; the number of site-days represents the total number of exceedances from all sites and all dates.

Ozone exceeded 75 ppb on 43 occasions during 21 dates across Louisiana. Most were 1 or 2 day episodes with peaks only slightly above the 75 ppb standard. There were never more than 5 sites exceeding 75 ppb ozone on the same date in 2008. Six of the 24 monitors never exceeded 75 ppb on any date in 2008. Baton Rouge accounted for more than half (26 out of 43) of all exceedances in the state, where 9 of the 10 monitors exceeded 75 ppb on at least one date in 2008. Ozone was greater than or equal to 75 ppb from at least one site in Baton Rouge on 16 days in 2008.

Table 2-2 lists the number of days and number of exceedances greater than or equal to 75 ppb in four areas of Louisiana (Baton Rouge, New Orleans, Lake Charles, and Shreveport), based on the monitor groupings shown in Figure 2-1. In New Orleans, Lake Charles, and Shreveport, each region had no more than 2 days and no more than 3 site-days of 8-hour ozone exceeding 75 ppb. These would not qualify as a sufficient number of exceedance days for ozone SIP modeling.

**Table 2-2. Total number of 75 ppb exceedances in 2008 by region.**

| Region | Number of days | Number of site-days |
|---|---|---|
| Baton Rouge | 16 | 26 |
| New Orleans | 1 | 1 |
| Shreveport | 2 | 3 |
| Lake Charles | 2 | 2 |

Ozone patterns in 2008 were characterized by occasional, localized, low to moderate exceedance episodes during the spring and summer. It was an active year for tropical weather in Louisiana. The state was impacted by Hurricane Gustav on September 1 and by Hurricane Ike from September 10-13, both of which most likely disrupted typical activities across the state. In addition, Tropical Storm Edouard and Tropical Depression Fay were in the vicinity on August 5 and August 24-25, respectively, helping mix out the air pollutants on those dates. No atypical anthropogenic activity patterns were apparent in 2008. The low number of exceedance days, low number of exceeding sites, low peak concentrations, and the active tropical season made this year atypically clean, and thus it is not an ideal year for ozone SIP modeling.

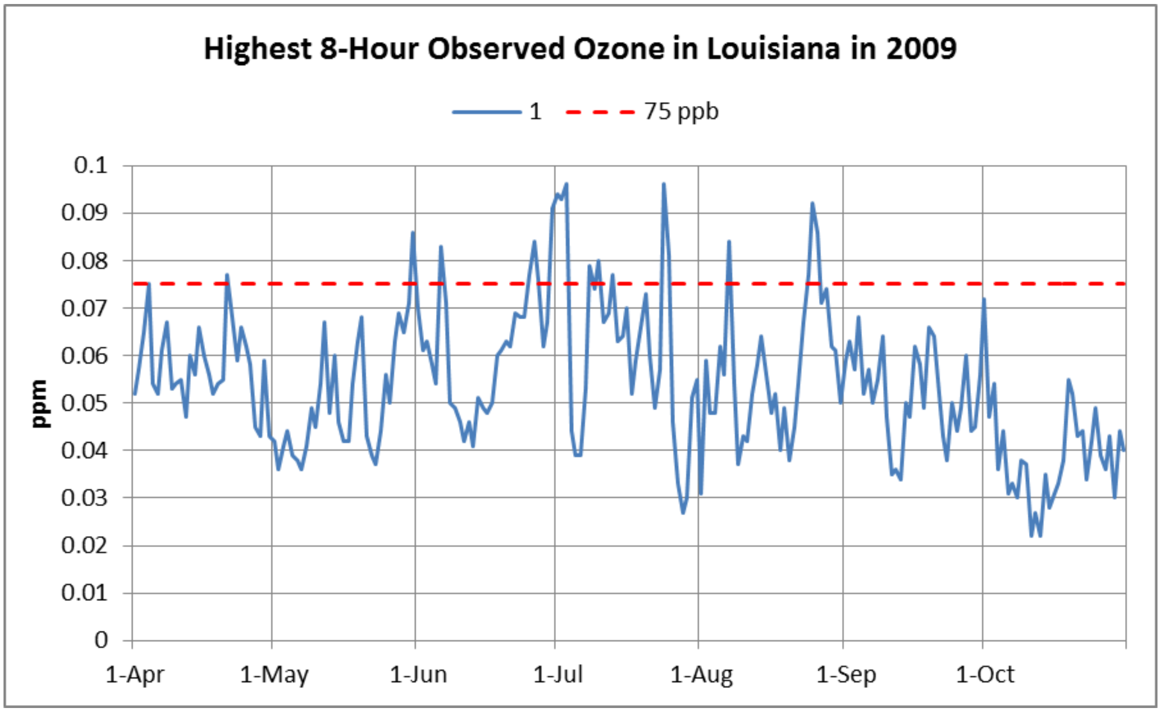
## 2.3 2009 Ozone Season

Figures 2-6 and 2-7 are parallel to Figures 2-4 and 2-5, showing time series of the highest observed 8-hour ozone at any monitor, and the frequency of sites exceeding various thresholds on each date in 2009 throughout Louisiana and in Baton Rouge, respectively. Data were available for 25 ozone monitors in 2009, but the statistics for the number of days and site-days exceeding thresholds in Tables 2-3 and 2-4 only consider the exceedances from the 24 monitors common to all three years.

Most ozone exceedances took place between June and August, with some of the highest 8-hour ozone levels in the 3-year period. Peaks reached 94, 96, and 96 ppb in Baton Rouge, Shreveport, and Lake Charles, respectively. But while the number of days when at least one monitor in Louisiana exceeded the 75, 70, 65, or 60 ppb thresholds was the lowest among the three ozone seasons, there were more ozone monitors that measured at least 75 ppb on at least one date in 2009 than in 2008 (21 sites vs. 18 sites); 2009 also had more site exceedances than in 2008 (68 site-days vs. 43 site-days). Baton Rouge showed similar trends, with the fewest number of days (14 days) at or over 75 ppb of all three years, but with more sites (10 out of 10) and more site-days (35) over 75 ppb than in 2008.

Table 2-4 separates the total number of observed 2009 exceedances into 4 regions of Louisiana. There were more exceedances in 2009 than in 2008 in all four regions. Shreveport, with only 2 ozone monitors, had 6 exceedance site-days; the other regions all had at least 10. All regions had at least 5 exceedance days in 2009.

Ozone patterns in 2009 were characterized by a few intense, widespread exceedance events during the summer. Tropical storm activity was relatively quiet near Louisiana. June was hot and dry as Baton Rouge recorded the third warmest June and fourth driest June on record. Conversely, October was very wet; Baton Rouge reported 21 rain days and the second wettest October on record, which was reflected by the fact that 8-hour ozone never exceeded 60 ppb at any monitor in Louisiana after October 1. The near-record heat in June could be considered an extreme meteorological condition, but ozone was only high at the beginning and end of the month, and was swept clean during the middle of the month. No atypical anthropogenic activity patterns were apparent in 2009, except that the year marked the low point in the US economic recession. However, the LDEQ believes that Louisiana was not impacted by the recession to the extent experienced in other regions of the US. The inactive tropical season and higher number of site exceedances in all four regions of Louisiana makes 2009 a better ozone season to model than 2008.



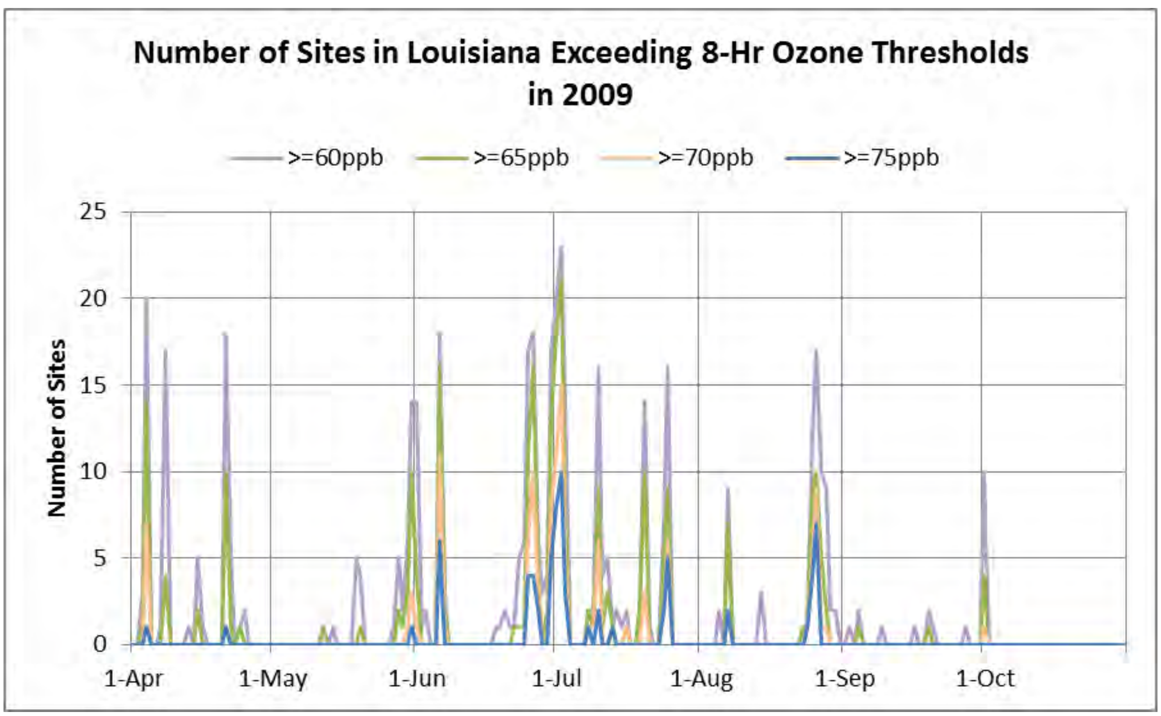




**Figure 2-6. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2009.**

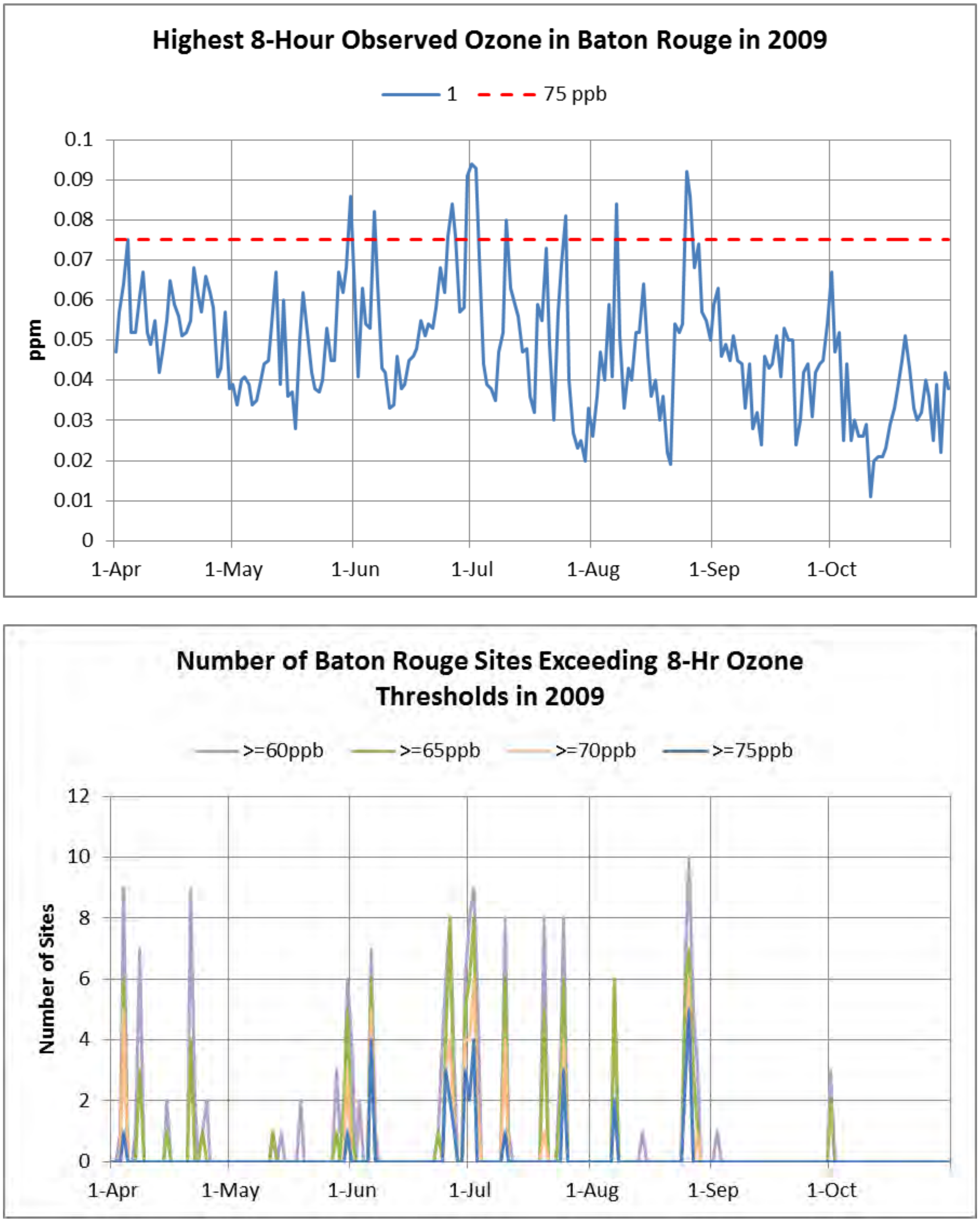



**Figure 2-7. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2009.**

**Table 2-3. 2009 ozone observation statistics.**

| | All Louisiana monitors | | Baton Rouge monitors | |
|---|---|---|---|---|
| Ozone threshold (ppb) | Number of days | Number of site-days | Number of days | Number of site-days |
| ≥ 75 ppb | 20 | 68 | 14 | 35 |
| ≥ 70 ppb | 27 | 119 | 17 | 58 |
| ≥ 65 ppb | 46 | 241 | 29 | 110 |
| ≥ 60 ppb | 71 | 428 | 42 | 179 |

**Table 2-4. Total number of 75 ppb exceedances in 2009 by region.**

| Region | Number of days | Number of site-days |
|---|---|---|
| Baton Rouge | 14 | 35 |
| New Orleans | 5 (5)[1] | 10 (12)[1] |
| Shreveport | 5 | 6 |
| Lake Charles | 8 | 11 |

[1]when including 1 additional site not available in 2008

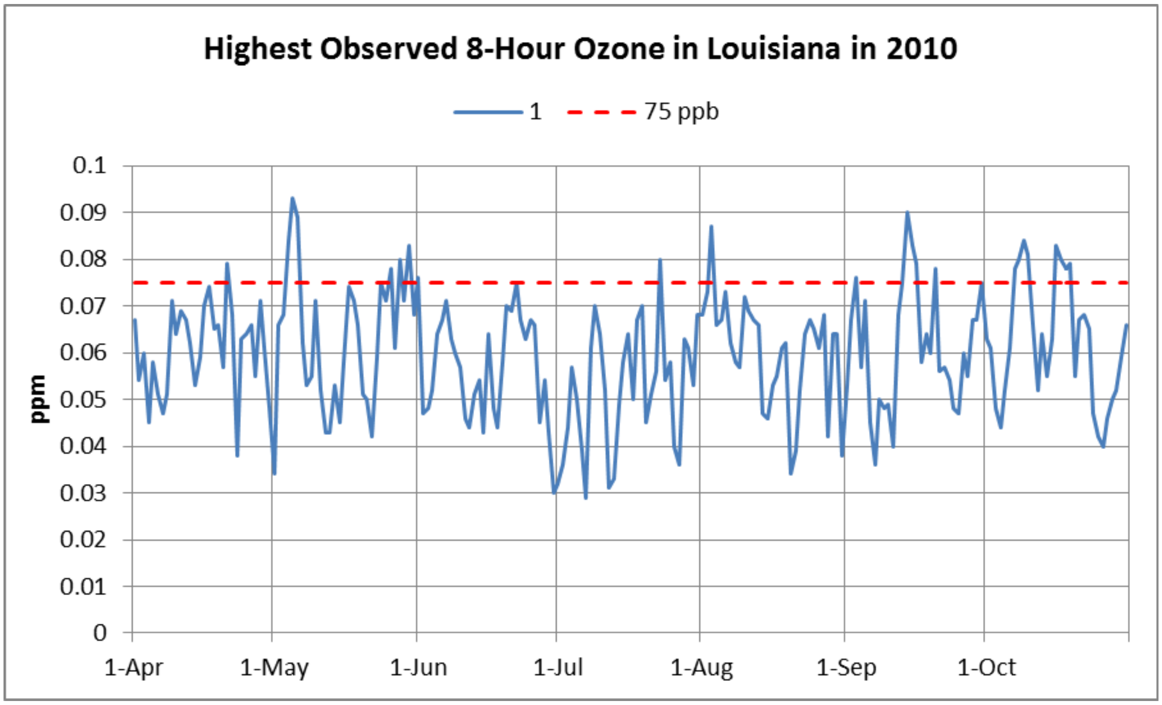
## 2.4 2010 Ozone Season

Figures 2-8 and 2-9 show similar sets of time series based on 2010 ozone data from the Louisiana and Baton Rouge monitors, respectively. Table 2-5 summarizes the number of days and site-days in 2010 that exceed the four thresholds in Louisiana and Baton Rouge. Table 2-6 breaks down the statistics at the 75 ppb cutoff for four regions in Louisiana.

The 2010 ozone season had the most number of days (27) during which at least one monitor recorded an exceedance, the most number of exceeding sites (22 out of the 24 sites common to all 3 years), and the most number of site-day exceedances (88 – twice as many as in 2008). This was true both statewide and in the Baton Rouge non-attainment area. Lake Charles was the only area that did not experience more exceedances than 2009.

Ozone patterns in 2010 were characterized by a variety of low to intense, localized and widespread exceedance events during the spring and late summer/fall. Tropical storms were minimal in 2010 except for tropical depression 5, which produced copious amounts of precipitation in Louisiana, resulting in the third wettest August on record in Baton Rouge. This was followed by a very dry September.

Overall, the higher number and variety of exceedance events would make the April to October, 2010 episode the ideal modeling period. However, the BP Deepwater Horizon oil production platform exploded on April 20, 2010, resulting in a massive oil spill in the outer Louisiana coastal waters. Cleanup efforts lasted for months as oil threatened to wash up onto the beaches, and fishing in the Gulf was suspended. This obviously represents an atypical activity and emissions pattern for the Gulf coast region. The EPA installed additional air quality sensors on the Louisiana coast to monitor for emissions from the spill, but no significant impacts to air quality were detected. According to the LDEQ, the oil spill also did not impact Louisiana's



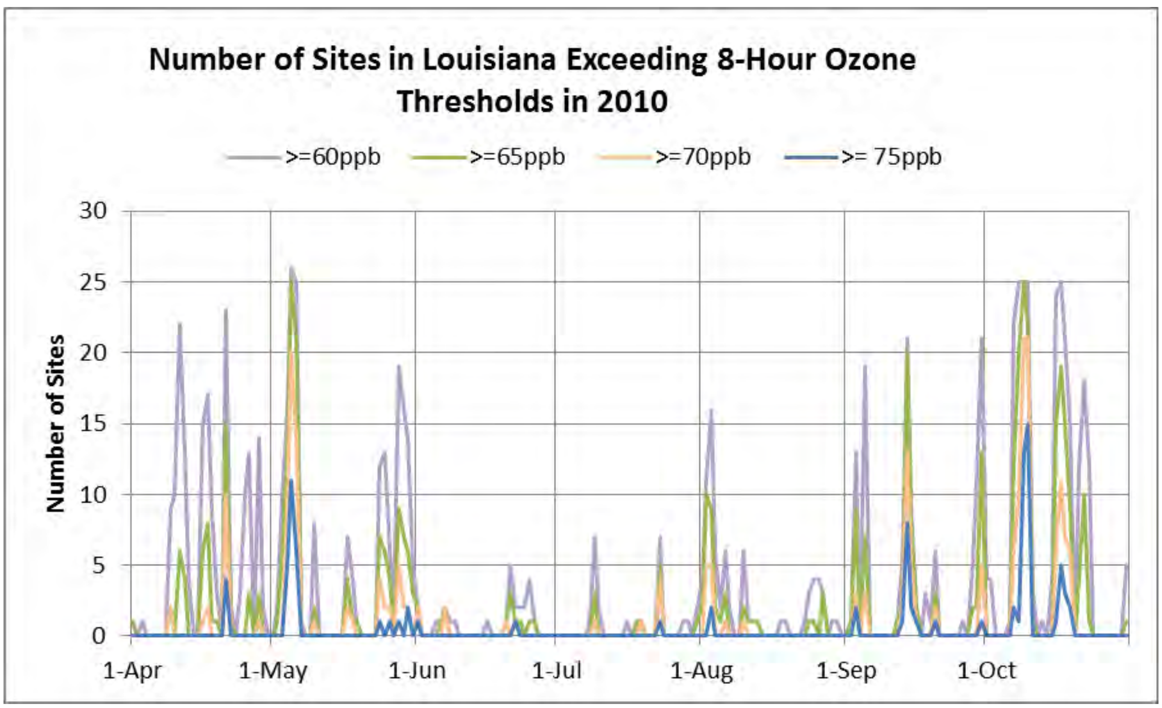
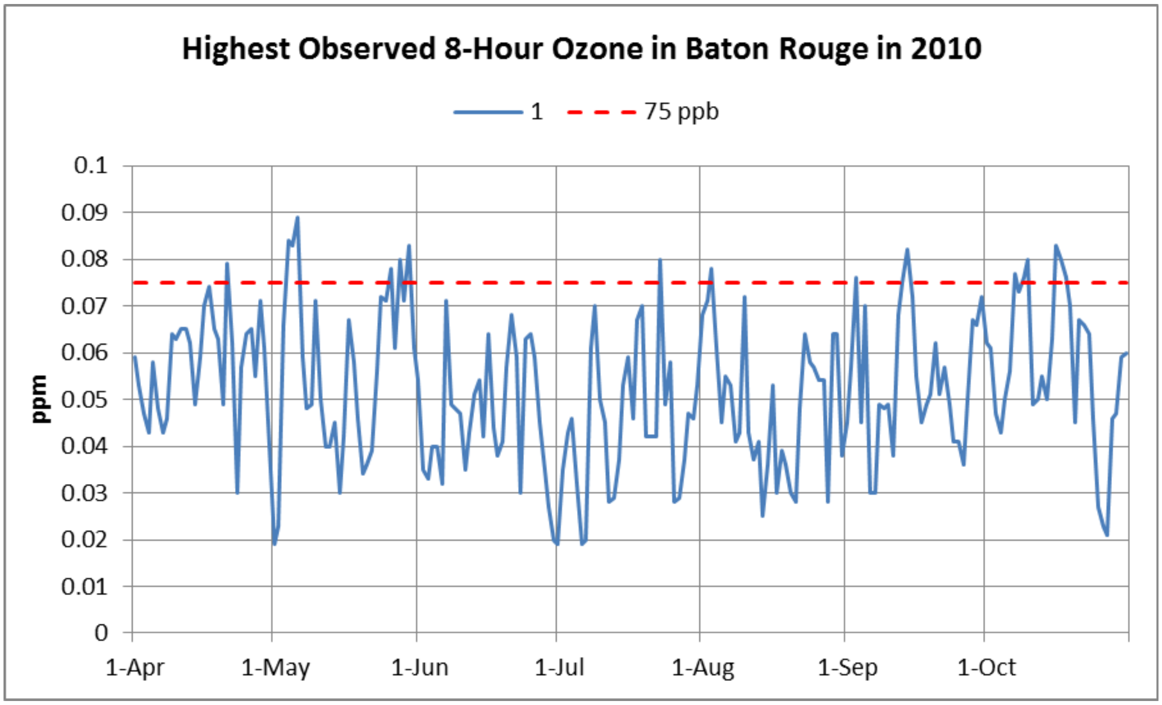




**Figure 2-8. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Louisiana in 2010.**



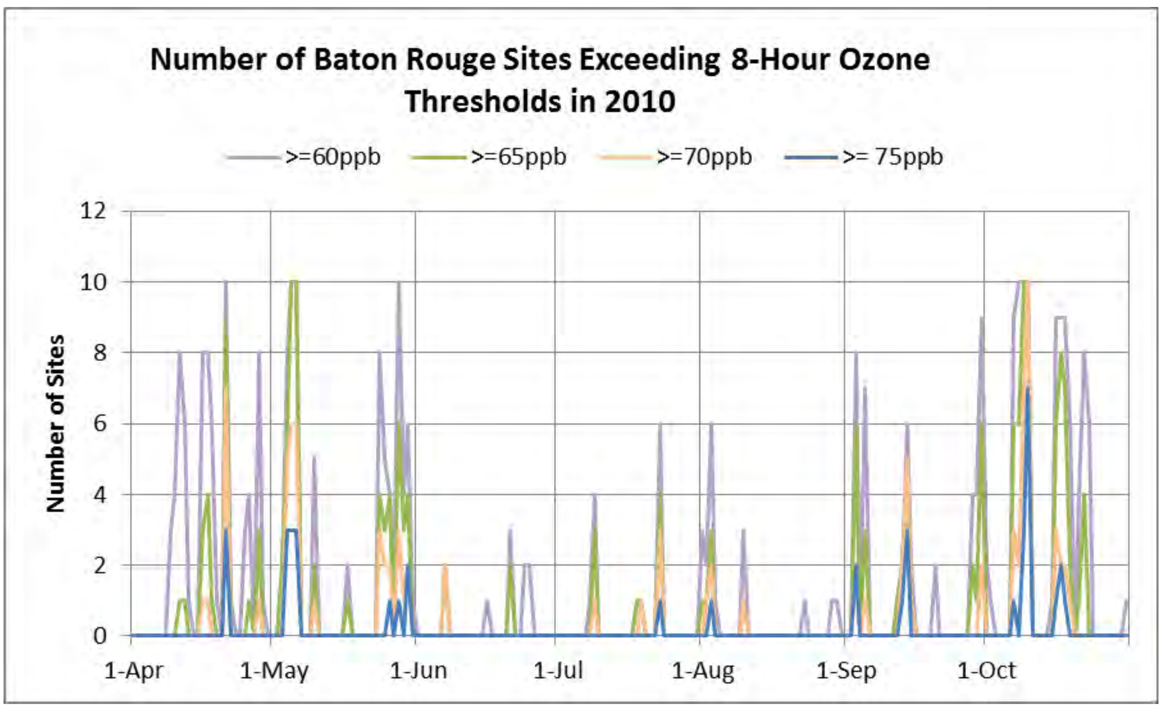




**Figure 2-9. Time series of the highest observed 8-hour ozone (top) and number of ozone sites above selected thresholds (bottom) in Baton Rouge in 2010.**

**Table 2-5. 2010 ozone observation statistics.**

| | All Louisiana monitors | | Baton Rouge monitors | |
|---|---|---|---|---|
| Ozone threshold (ppb) | Number of days | Number of site-days | Number of days | Number of site-days |
| ≥ 75 ppb | 27 | 88 | 18 | 39 |
| ≥ 70 ppb | 44 | 217 | 35 | 95 |
| ≥ 65 ppb | 77 | 427 | 49 | 184 |
| ≥ 60 ppb | 107 | 791 | 72 | 329 |

**Table 2-6. Total number of 75 ppb exceedances in 2010 by region.**

| Region | Number of days | Number of site-days |
|---|---|---|
| Baton Rouge | 18 | 39 |
| New Orleans | 8 (8)[1] | 15 (21)[1] |
| Shreveport | 11 | 14 |
| Lake Charles | 5 | 9 |

[1]when including 1 additional site not available in 2008

economy as much as it hurt other Gulf States because the idled fishermen were hired to help clean up the oil spill and because Louisiana's beaches are not typically a tourist destination.

Nevertheless, especially during the first few months of the oil spill, emissions patterns in the Gulf were significantly altered from normal oil and gas production activities, commercial marine shipping, and fishing operations, not to mention fire-related and evaporative emissions from the ocean surface. As a precaution, we have elected to disregard the spring of 2010 to avoid potential impacts from the oil spill. Ozone monitoring statistics for the August-October, 2010 period are summarized in Tables 2-7 and 2-8. Modeling late 2010 would include the widespread ozone event on October 10, when 15 of the 26 ozone monitors across the state exceeded 75 ppb. However, this would reduce the number of 75 ppb exceedances in all regions; Lake Charles would only have 4 days and 6 exceedances over 75 ppb if the modeling period was confined to August through October. Except for Baton Rouge, the total number of exceedance site-days in late 2010 is consistent with the total in 2009 in other regions of the State, and certainly higher than in 2008.

**Table 2-7. August-October 2010 ozone observation statistics.**

| | All Louisiana monitors | | Baton Rouge monitors | |
|---|---|---|---|---|
| Ozone threshold (ppb) | Number of days | Number of site-days | Number of days | Number of site-days |
| ≥ 75 ppb | 16 | 57 | 10 | 22 |
| ≥ 70 ppb | 20 | 129 | 17 | 47 |
| ≥ 65 ppb | 38 | 247 | 23 | 93 |
| ≥ 60 ppb | 53 | 412 | 33 | 158 |

**Table 2-8. Total number of 75 ppb exceedances in August-October 2010 by region.**

| Region | Number of days | Number of site-days |
|---|---|---|
| Baton Rouge | 10 | 22 |
| New Orleans | 6 | 12 (15)[1] |
| Shreveport | 8 | 11 |
| Lake Charles | 4 | 6 |

[1]when including 1 additional site not available in 2008

## 2.5 Final Consideration and Selection

Table 2-9 summarizes the number of 75 ppb exceedances for each potential modeling period, broken down for the entire State and for each region. We ruled out 2008 because of the low number of exceedances, particularly in New Orleans, Shreveport, and Lake Charles, and the unusually active tropical season. We believe 2009 would have been adequate, but it had the fewest number of exceedance days in Baton Rouge and across the state. Sites like Westlake and Monroe only exceeded 60 ppb on 5 days during the entire season. If 60 ppb is the lowest observed 8-hour ozone in which dates can be used for design value scaling, then these sites would barely apply the minimum allowed.

**Table 2-9. Summary of the number of 75 ppb exceedances during four potential modeling periods, by region (extracted from Tables 1 through 8).**

| Region | 2008 | 2009 | 2010 | 2010 (Aug-Oct) |
|---|---|---|---|---|
| Louisiana | 43 | 68 | 88 | 57 |
| Baton Rouge | 26 | 35 | 39 | 22 |
| New Orleans | 1 | 10 | 15 | 12 |
| Shreveport | 3 | 6 | 14 | 11 |
| Lake Charles | 2 | 11 | 9 | 6 |

Table 2-10 displays the total number of days in which each site in Baton Rouge exceeded 60, 65, 70, and 75 ppb for five potential modeling periods (adding a combination of June-August 2009 and August-October 2010). These data are useful to compare how many days above each concentration threshold are available in each period for the design value scaling approach as outlined in the EPA's current ozone modeling guidance.

The full 2010 ozone season had the most number of exceedance days, sites, and site-days in most regions, and was the ideal period to model, but complications from the Gulf oil spill could be an issue especially in the first few months following the oil rig explosion. If only the last three months of the 2010 ozone season were modeled, some sites like Pride and French Settlement, where the 4th highest 8-hour daily maximum ozone in 2010 was in exceedance (76 ppb), would also be close to the minimum number of days available for design value scaling (French Settlement had only 8 days above 60 ppb in the August to October, 2010 period).

Ultimately we selected September-October 2010 as the primary modeling period for the ozone modeling attainment demonstration. Only two Louisiana exceedances occurred in August during the first few days of the month, and the remainder of August was characterized by low state-wide peak 8-hour ozone ranging between 30-60 ppb.  This decision also included a special consideration for Shreveport, which had the highest number of exceedance days during the fall of 2010.

**Table 2-10.  Summary of number of days during five potential modeling periods when daily 8-hour ozone exceeded 60, 65, 70, and 75 ppb at each monitoring site in the Baton Rouge nonattainment area.**

| Site | Threshold | 2008 | 2009 | 2010 | Aug - Oct, 2010 | Jun -Aug, 2009 + Aug-Oct, 2010 |
|---|---|---|---|---|---|---|
| Baton Rouge/Capitol | 75 ppb | 0 | 4 | 5 | 2 | 6 |
| | 70 ppb | 1 | 7 | 10 | 4 | 11 |
| | 65 ppb | 8 | 10 | 19 | 9 | 19 |
| | 60 ppb | 22 | 15 | 34 | 16 | 29 |
| Baker | 75 ppb | 2 | 2 | 5 | 2 | 4 |
| | 70 ppb | 6 | 5 | 7 | 3 | 7 |
| | 65 ppb | 13 | 7 | 16 | 9 | 15 |
| | 60 ppb | 26 | 14 | 30 | 14 | 24 |
| Bayou Plaquemine | 75 ppb | 7 | 2 | 3 | 2 | 4 |
| | 70 ppb | 15 | 4 | 10 | 6 | 9 |
| | 65 ppb | 27 | 11 | 23 | 12 | 19 |
| | 60 ppb | 42 | 16 | 42 | 22 | 30 |
| Baton Rouge/LSU | 75 ppb | 1 | 11 | 7 | 3 | 14 |
| | 70 ppb | 9 | 13 | 14 | 4 | 16 |
| | 65 ppb | 20 | 15 | 26 | 11 | 25 |
| | 60 ppb | 33 | 25 | 42 | 21 | 42 |
| Carville | 75 ppb | 3 | 4 | 2 | 1 | 5 |
| | 70 ppb | 11 | 5 | 10 | 7 | 12 |
| | 65 ppb | 25 | 14 | 24 | 12 | 22 |
| | 60 ppb | 30 | 28 | 38 | 19 | 37 |
| Dutchtown | 75 ppb | 2 | 3 | 6 | 6 | 9 |
| | 70 ppb | 11 | 4 | 13 | 9 | 13 |
| | 65 ppb | 19 | 10 | 19 | 13 | 23 |
| | 60 ppb | 31 | 19 | 34 | 17 | 31 |
| French Settlement | 75 ppb | 4 | 4 | 4 | 2 | 5 |
| | 70 ppb | 12 | 6 | 6 | 3 | 8 |
| | 65 ppb | 24 | 14 | 12 | 4 | 13 |
| | 60 ppb | 43 | 20 | 22 | 8 | 22 |
| Grosse Tete | 75 ppb | 3 | 1 | 3 | 2 | 3 |
| | 70 ppb | 4 | 4 | 14 | 6 | 10 |
| | 65 ppb | 8 | 9 | 23 | 12 | 20 |
| | 60 ppb | 26 | 14 | 41 | 17 | 29 |
| Port Allen | 75 ppb | 1 | 1 | 1 | 1 | 2 |
| | 70 ppb | 5 | 4 | 5 | 3 | 7 |
| | 65 ppb | 14 | 7 | 14 | 8 | 15 |
| | 60 ppb | 21 | 12 | 24 | 14 | 25 |
| Pride | 75 ppb | 3 | 3 | 3 | 1 | 4 |
| | 70 ppb | 11 | 6 | 6 | 2 | 7 |
| | 65 ppb | 23 | 13 | 8 | 3 | 11 |
| | 60 ppb | 36 | 16 | 22 | 10 | 20 |

## 3.0 METEOROLOGICAL MODELING EVALUATION

The WRF model, version 3.3.1, was run by Alpine Geophysics from August through October 2010 to cover the LDEQ 36, 12, and 4 km photochemical modeling domains. WRF output was used to prepare meteorological inputs for the CAMx photochemical model. Since CAMx model performance depends on the accuracy of meteorology, predicted wind, temperature, and precipitation patterns on the 4 km grid were evaluated against available measurement data across Louisiana. Emphasis was placed on the 16 dates when 8-hour ozone exceeded 75 ppb from at least one ozone monitor in the State – August 3; September 3, 13-16, 20, and 30; and October 7-10 and 16-19. This section details the WRF model performance over the State of Louisiana and serves as a supplementary evaluation report to the original documentation developed by Alpine (2012).

Meteorological data sites were grouped into two regions – northern Louisiana, which includes Shreveport, and southern Louisiana, which includes Baton Rouge, New Orleans, and Lake Charles. This breakout allows us to separately analyze WRF performance for a coastal-influenced zone, and an inland zone. Figure 3-1 shows the locations of all monitoring stations used in this analysis.

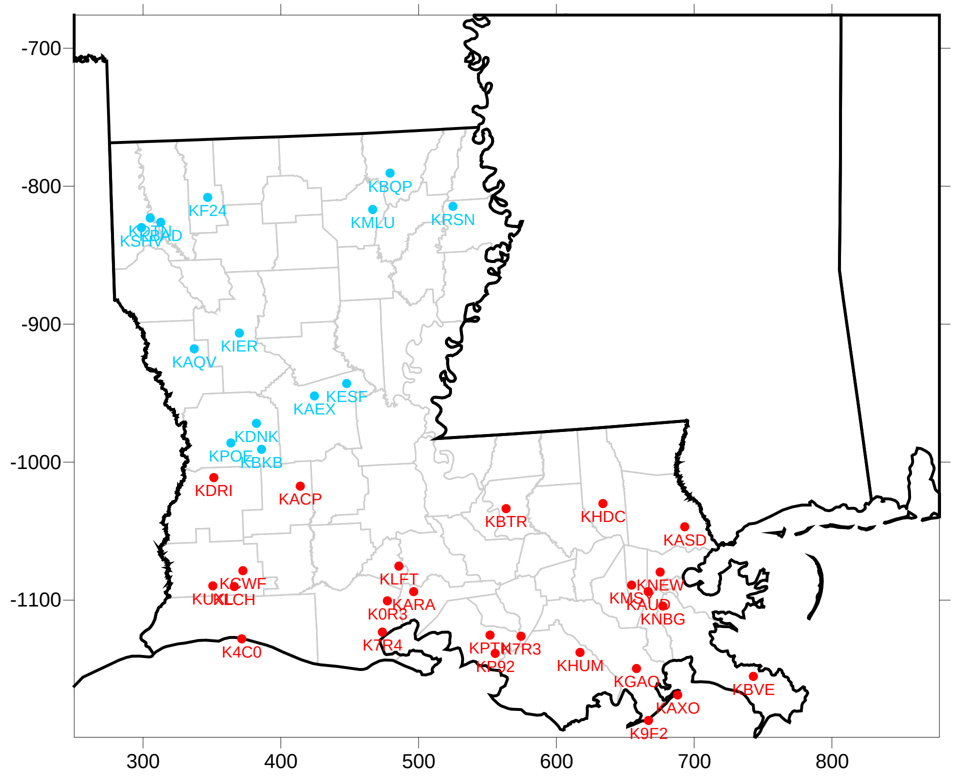



**Figure 3-1. Meteorology stations in Louisiana with the north and south sites colored in blue and red, respectively.**

## 3.1 Wind speed

Figure 3-2 compares hourly time series of predicted and observed wind speed from August to October, 2010 averaged over all sites in northern Louisiana. Blue lines represent the WRF-predicted wind speeds; black lines show the observed. Vertical lines representing midnight CST for each date are plotted to differential the days. Figure 3-3 shows the hourly time series of wind speed bias in northern Louisiana.

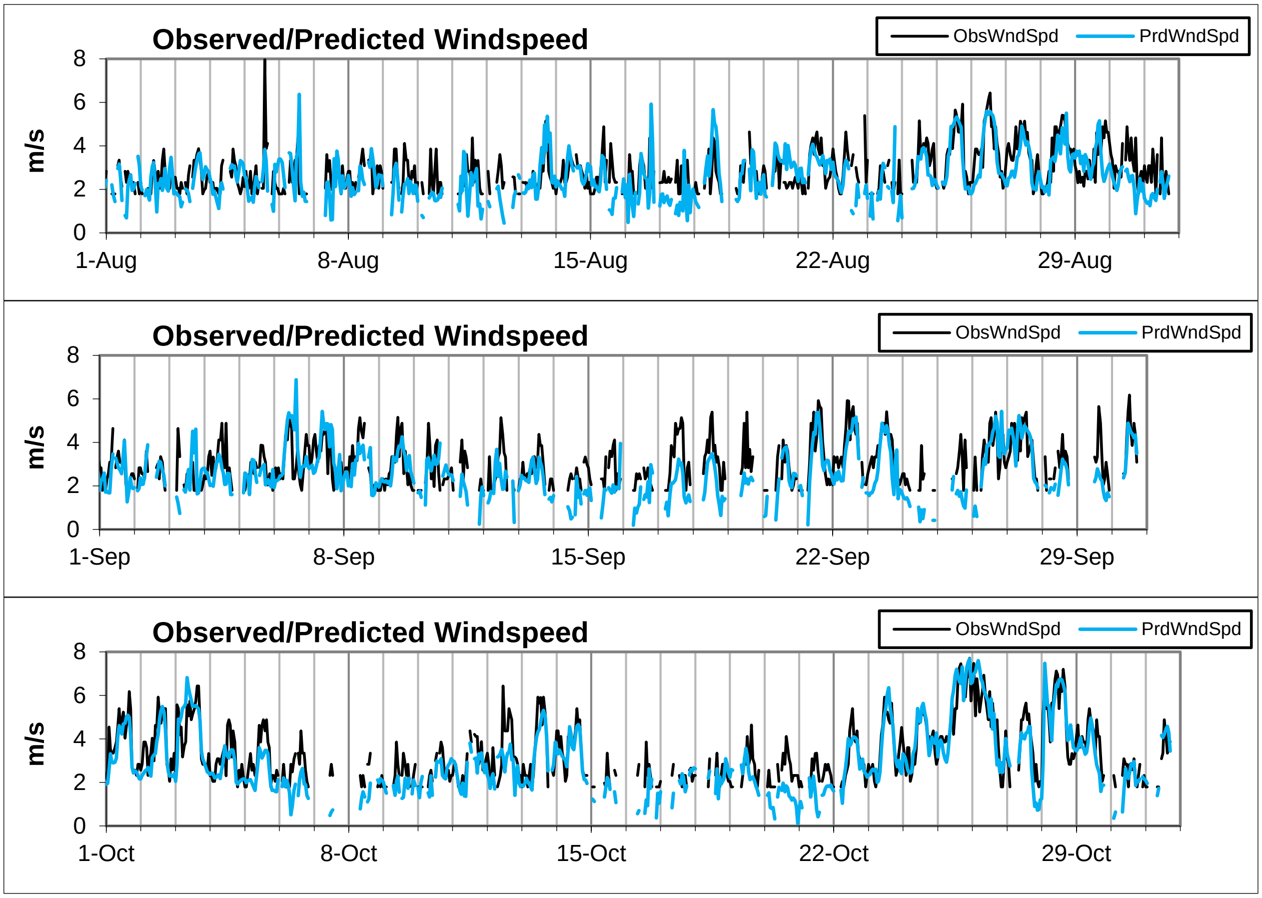



**Figure 3-2. Hourly predicted (blue) and observed (black) wind speed averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom).**

WRF tended to under predict winds in northern Louisiana, especially from mid-September to mid-October, when the bulk of the high ozone dates occurred. The under predicted wind speeds could result in more stagnation and higher ozone concentrations in CAMx.

Similar sets of time series are shown in Figures 3-4 and 3-5, respectively, for southern Louisiana. WRF is shown in red; the observed is in black. The bias was within ±2 m/s for most hours, but

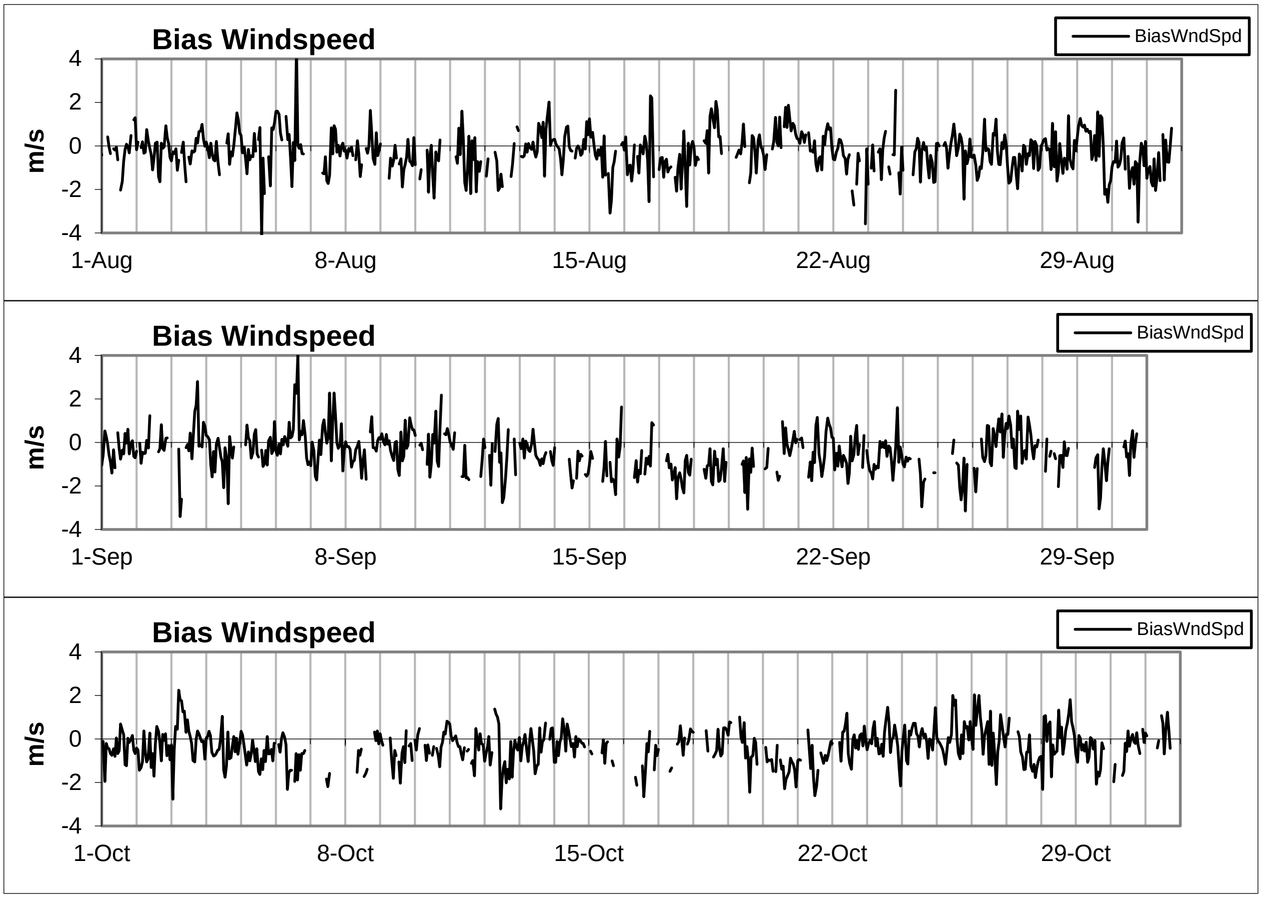



**Figure 3-3. Hourly wind speed bias over all sites in northern Louisiana for August (top), September (middle) and October (bottom).**

there tended to be an under prediction of wind speeds during most hours on the episode dates in October. Agreement tended to be slightly better than in northern Louisiana.

Figure 3-6 contains four scatter plots comparing hourly predicted and observed wind speeds, but the pairings were limited to the dates when 8-hour ozone exceeded 75 ppb anywhere in the state. Northern Louisiana pairings are shown on the top and southern Louisiana are shown on the bottom. Hours with episode dates in September are shown on the left, hours with episodes dates in October are shown on the right. August was excluded because it is only used for model spin-up. Red circles represent daytime hours (8 AM – 6 PM CST) and blue represents nighttime hours (7 PM to 7 AM). Ideally, all of the pairings should line up on the solid black diagonal line, but any pairings between the two black dashed lines, which represent wind speeds within ±2 m/s of the observed, are considered to perform well. Statistics are also included to show the regression line and the fraction of hours when the bias is between ±0.5, 1, and 2 m/s.

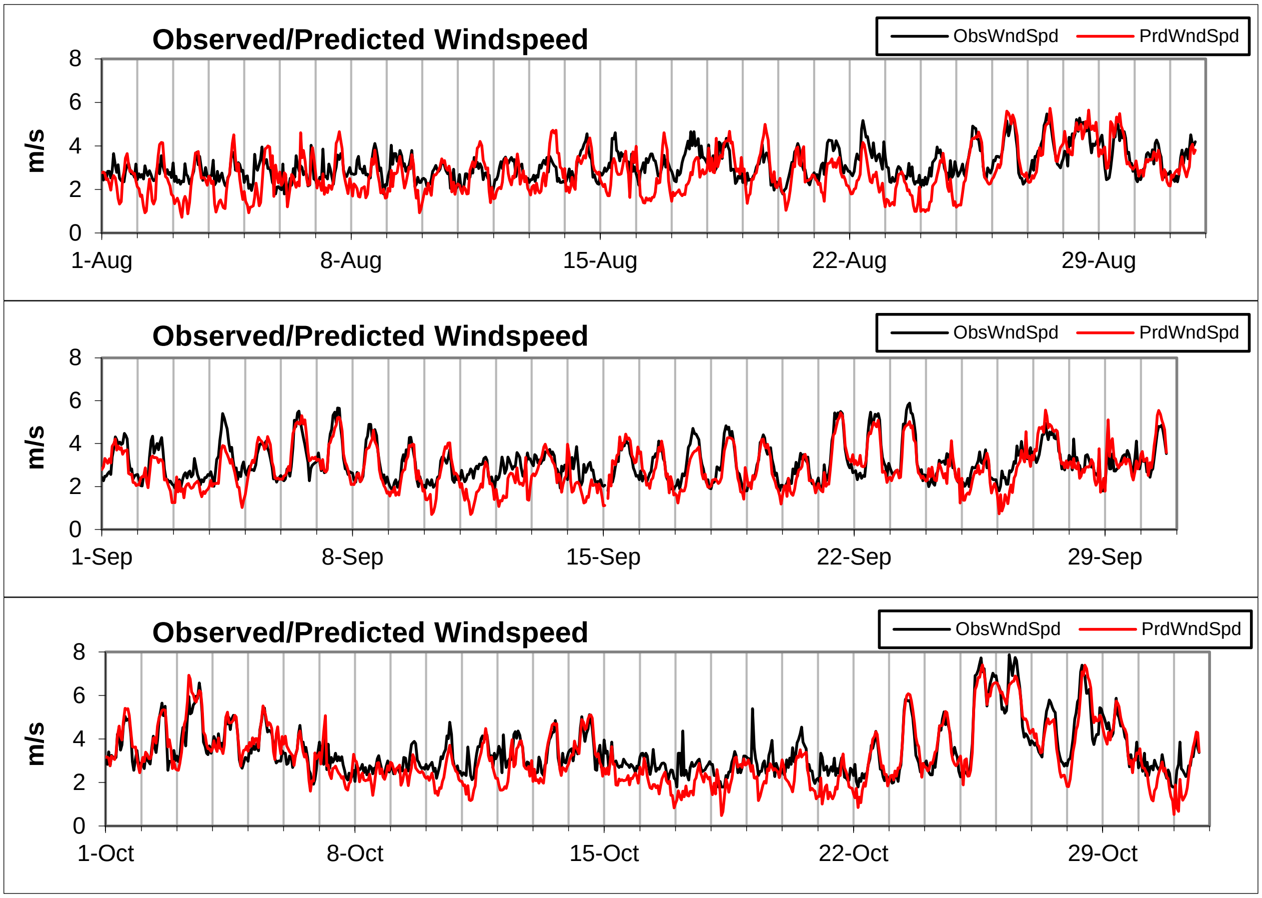



**Figure 3-4. Time series of hourly predicted (red) and observed (black) wind speeds averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom).**

WRF predicted wind speeds within 2 m/s of the observed during most hours of the episode dates in both northern and southern Louisiana. The hours that exceeded the ±2 m/s bias were all under predicted. WRF performed the best in September in southern Louisiana, when 99% and 89% of the episode hours were within 2 and 1 m/s of the observed, respectively. In October, the daytime wind speeds, which were generally faster than at night, were mostly under predicted throughout Louisiana.

Figure 3-7 shows "soccer goal" plots displaying daily wind speed performance statistics. The plots are ordered similarly to Figure 3-6. Statistics for all dates of the month are plotted, but the high ozone dates are highlighted in red. The "goals" (outlined in blue) represent benchmarks for exceptionally good performance; daily wind speed bias no greater than ±0.5 m/s and wind speed root mean squared error (RMSE) no greater than 2 m/s.

In northern Louisiana, all dates in both September and October met the daily RMSE performance benchmark while the daily bias benchmark was met on about 60% of all dates

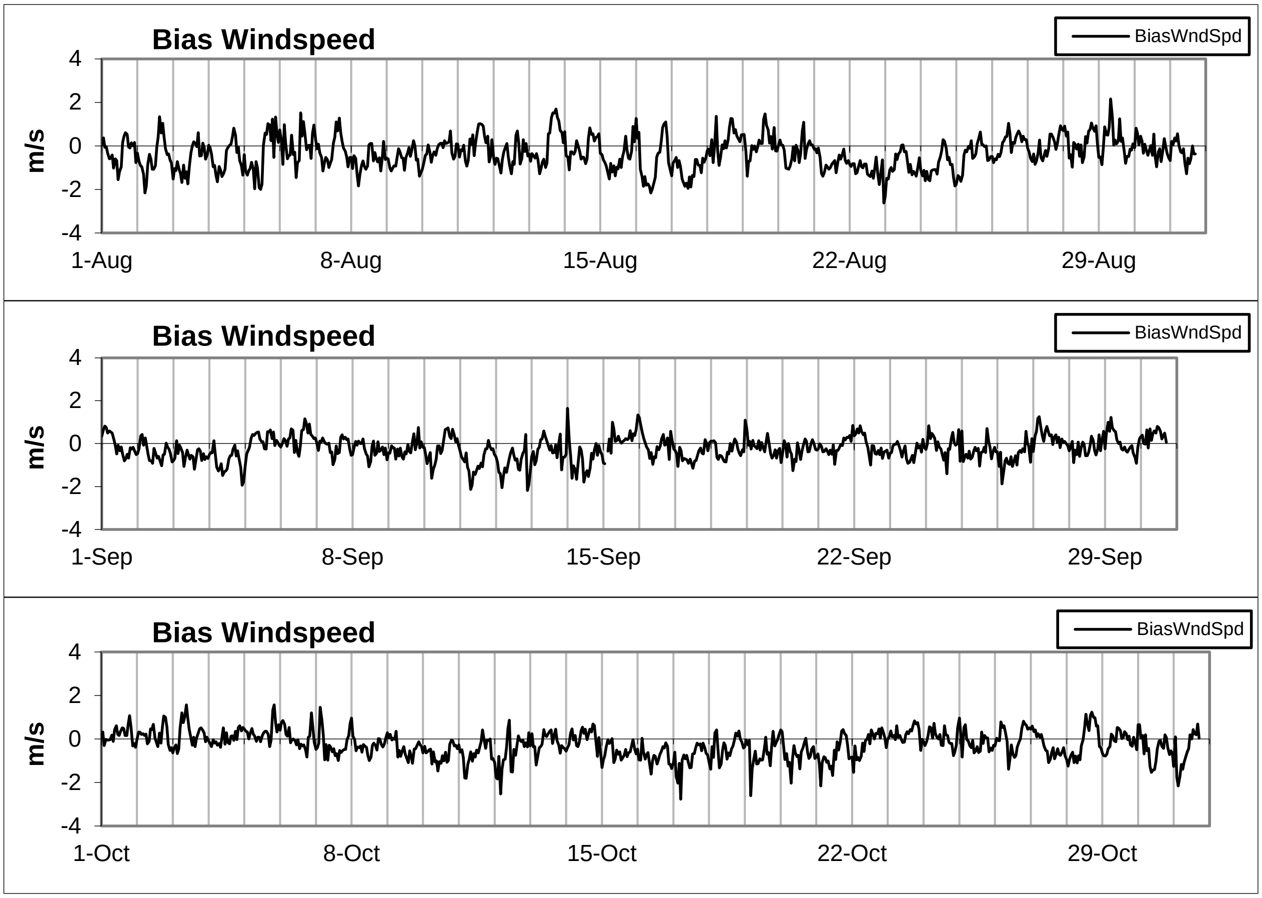



**Figure 3-5. Time series of hourly wind speed bias over all sites in southern Louisiana for August (top), September (middle) and October (bottom).**

during the 2 month period. Among the episode dates, all had a negative wind speed bias with 7 of the 15 dates in the 2 month period inside the soccer goal line. However, most dates were within -1 m/s bias, which is also quite good.

In southern Louisiana, the daily wind speed bias statistics were better, especially in September when over 70% of all dates and episode dates met the performance goals. In October, the high ozone dates all had negative biases, with half of these within the bias benchmark and all within -1 m/s bias.

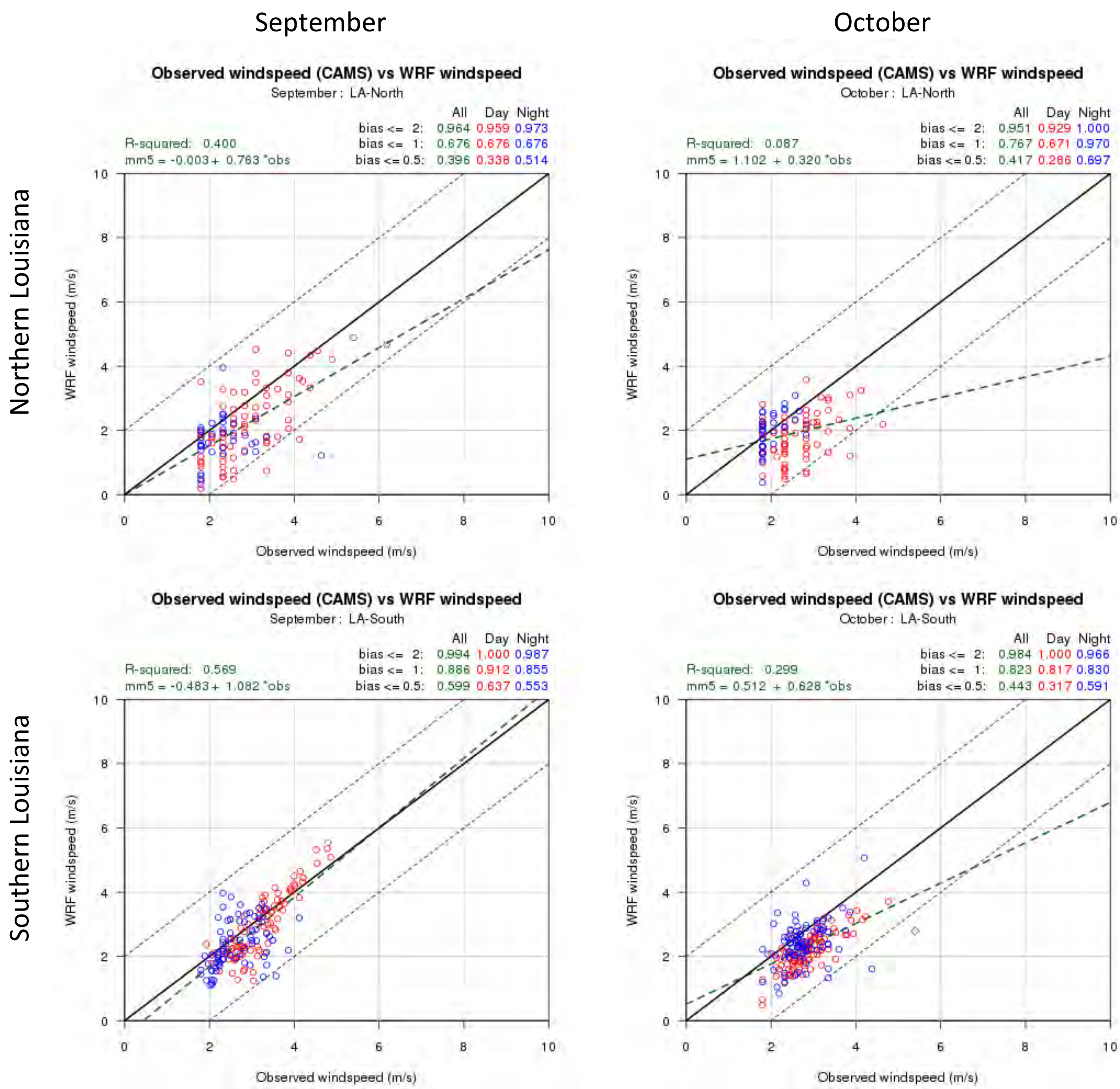



**Figure 3-6. Scatter plots of hourly predicted and observed wind speeds on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the 1:1 perfect correlation line; the two black dashed lines represent the ±2 m/s bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±0.5, 1, and 2 m/s.**

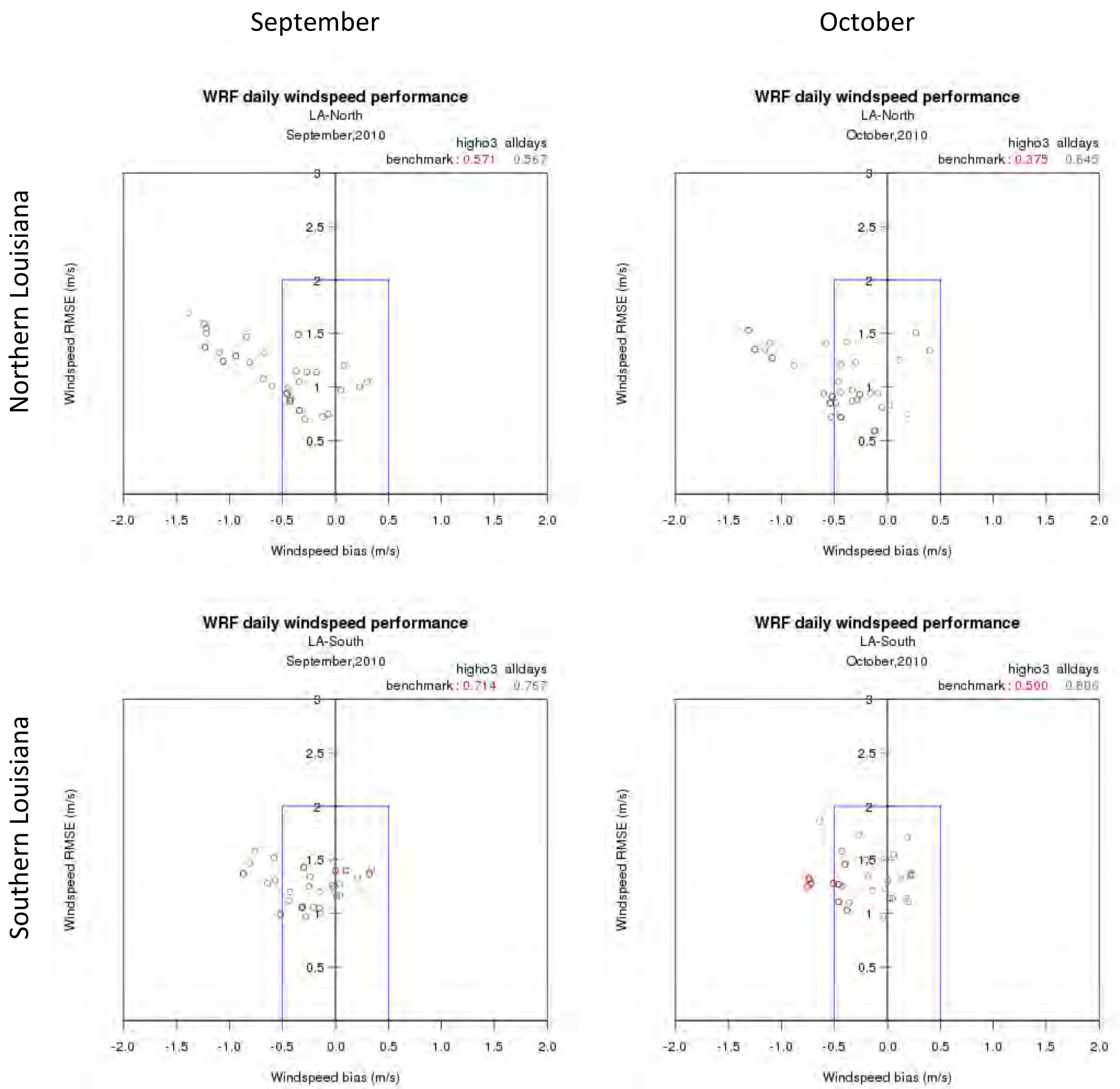



**Figure 3-7. Soccer goal plot of daily wind speed statistics. Red circles highlight the high ozone dates.**

## 3.2 Wind Direction

Figures 3-8 and 3-9 show hourly time series of predicted and observed wind direction averaged among all the meteorology stations in northern and southern Louisiana, respectively. The scatter plots shown in Figure 3-10 limit the hourly predicted and observed wind direction pairings to the high ozone dates, with red circles representing daytime hours and blue representing nighttime hours. The two dotted diagonal lines highlight daily-averaged bias within 30 degrees of the observed.

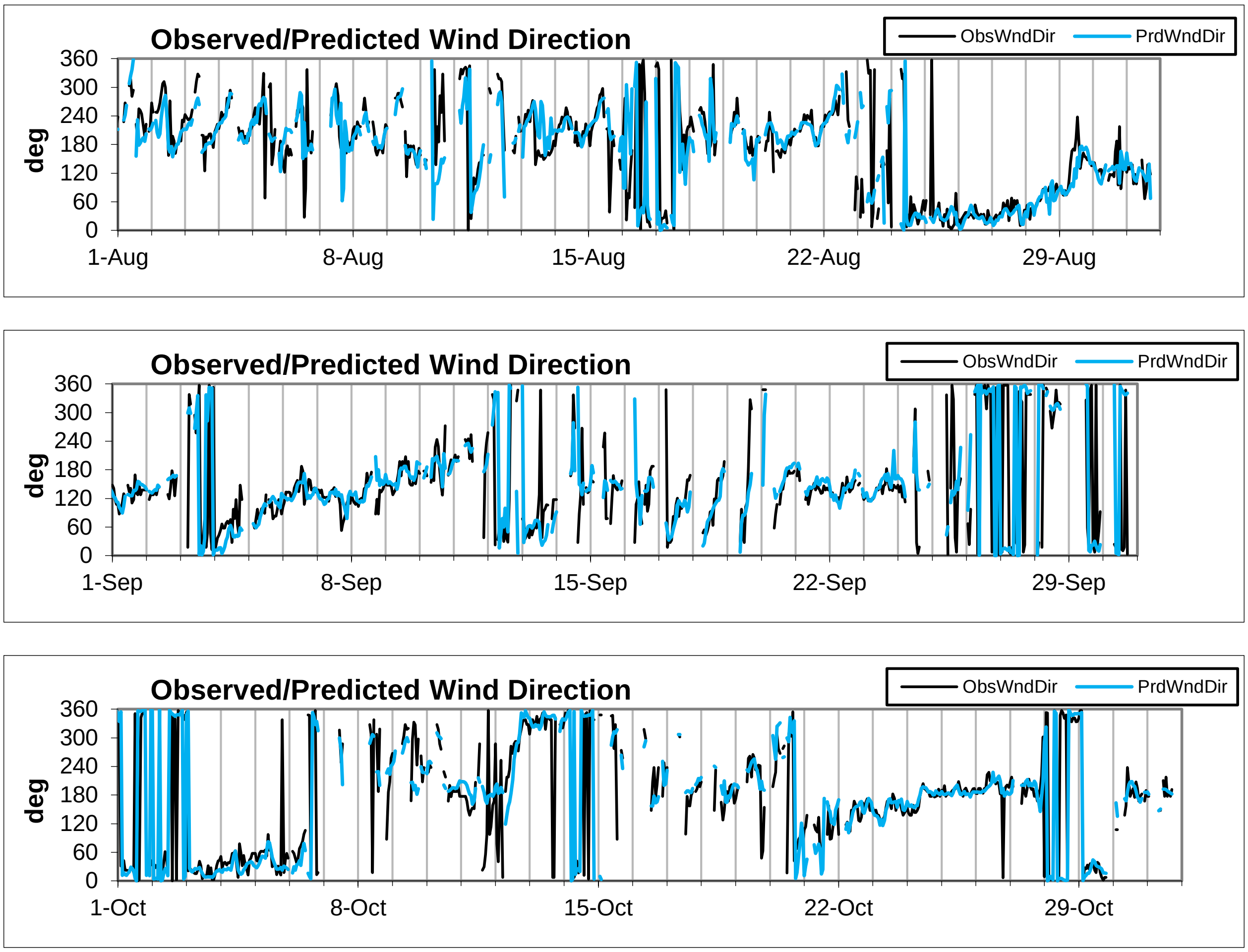



**Figure 3-8. Hourly predicted (blue) and observed (black) wind direction averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom).**

In northern Louisiana, the hourly wind direction bias was within ±30 degrees for about 60% of all hours on the episode dates. September wind direction performance was somewhat scattered, likely due to the very light wind speeds predicted, which can result in more variability

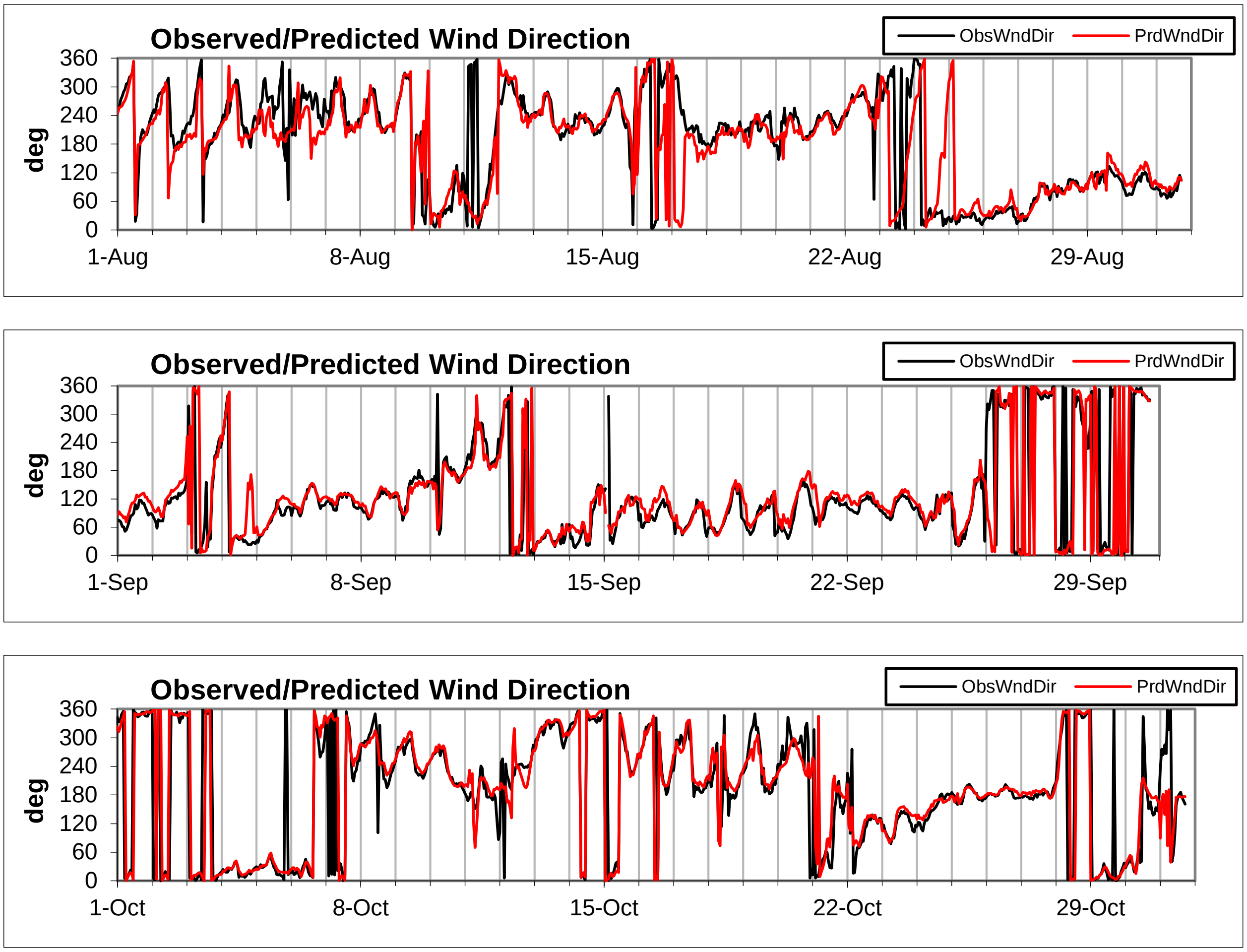



**Figure 3-9. Hourly predicted (red) and observed (black) wind direction averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom).**

in direction. October had numerous hours in which WRF predicted southwest winds when the observed were west to northwesterly.

WRF performed better in southern Louisiana than northern Louisiana. Over 85% of all hours on the episode dates had a bias within ±30 degrees in southern Louisiana. The best performance took place in September during the daylight hours, when 90% of the hours had a bias between ±30 degrees. WRF correctly predicted that the wind direction during most high ozone dates would be between north and southeast direction (going clockwise) in September, and between the southwest and north in October.

Soccer goal plots comparing daily wind direction error with wind speed RMSE are shown in Figure 3-11. The benchmark for exceptional performance is for RMSE below 2 m/s and wind direction error less than 30 degrees. All dates in the month are shown; high ozone dates are highlighted in red. In all four plots, the fraction of dates meeting the performance goals were

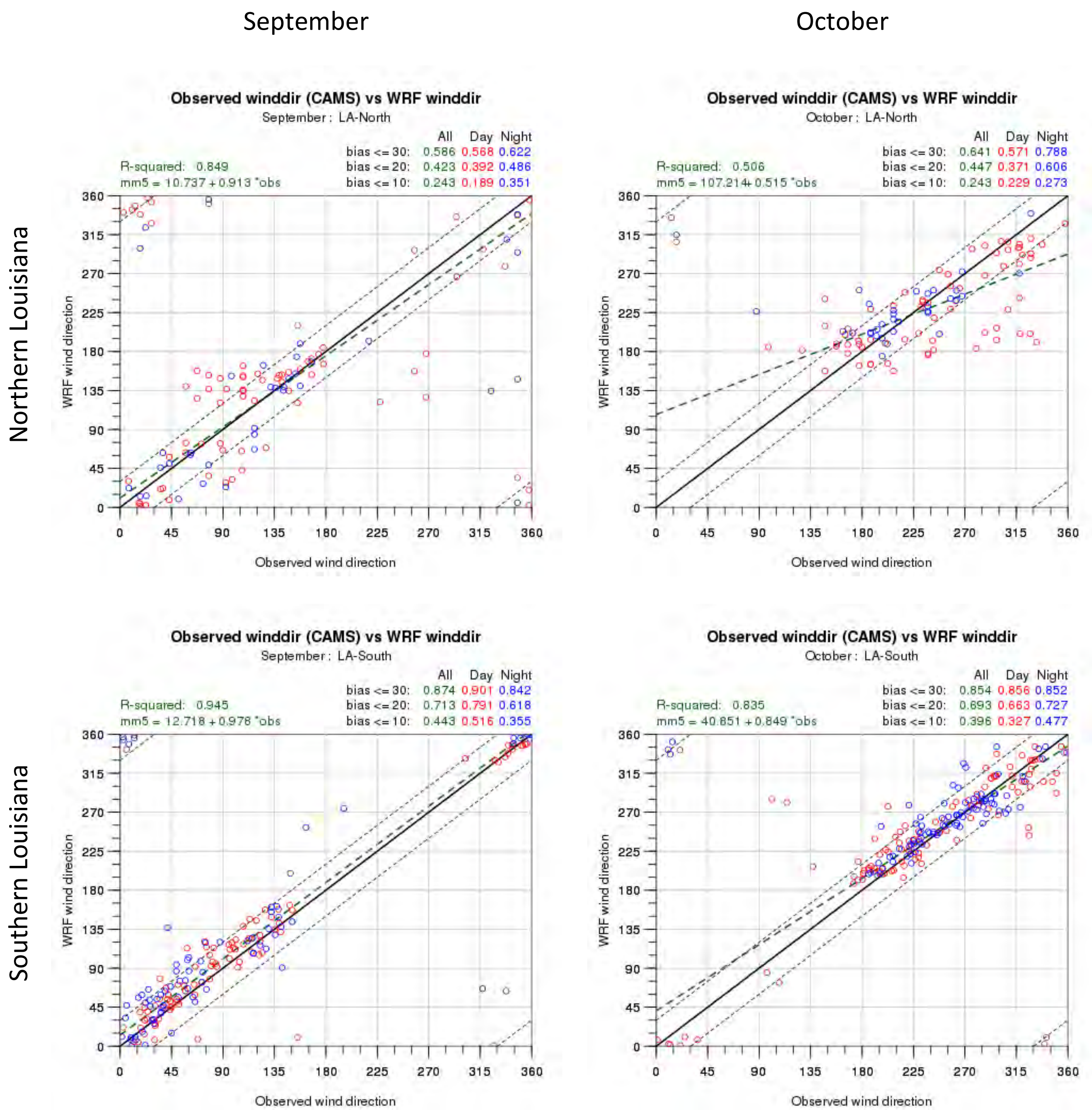



**Figure 3-10. Scatter plots of hourly predicted and observed wind direction on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the 1:1 perfect correlation line; the two black dashed lines represent the ±30 degree bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±10, 20, and 30 degrees.**

September

October

Northern Louisiana

Southern Louisiana

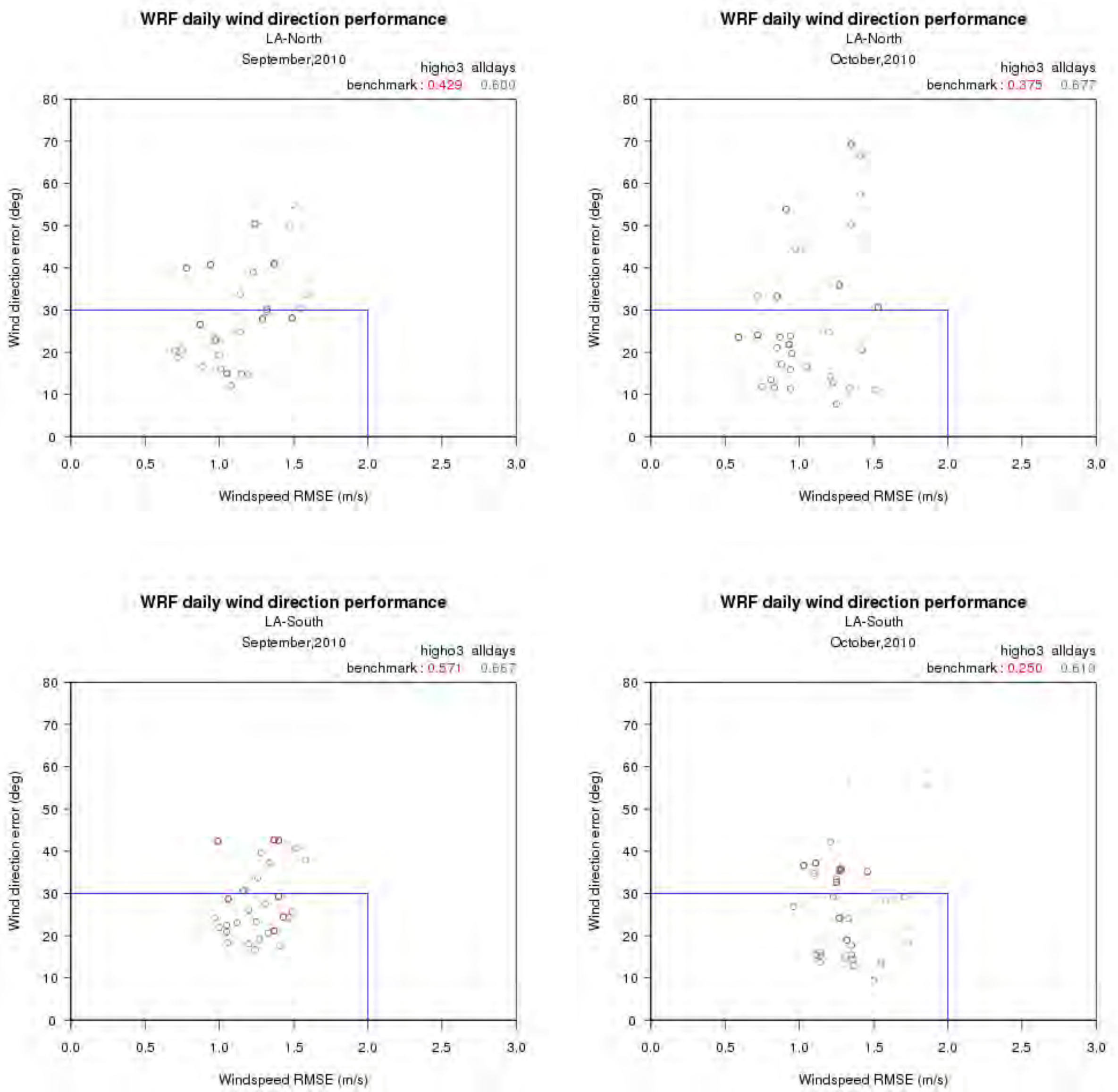



**Figure 3-11. Soccer goal plots of daily wind direction statistics. Red circles highlight the high ozone dates.**

lower when considering only high ozone dates than when using all dates in the month. On high ozone dates, stagnant air and low wind speeds are common, which may have resulted in more light and variable wind conditions on these dates, making it more difficult to achieve a directional error of less than 30 degrees. September in southern Louisiana had the highest fraction of high ozone dates inside the goal (57%); October in southern Louisiana had the lowest fraction (25%). Overall, wind direction performance in this application is better than most WRF applications we have analyzed in other areas of the US.

## 3.3 Temperature

Figures 3-12 and 3-13 display hourly time series of predicted and observed temperatures from August to October, 2010 averaged over all sites in northern and southern Louisiana, respectively. The scatterplots in Figure 3-14 show hourly predicted and observed pairings on the high ozone dates, separated for daytime and nighttime hours. Points within the two dotted lines represent predicted temperatures within 2 K of the observed. Soccer goal plots in Figure 3-15 display daily temperature bias and error statistics, where the performance benchmarks are defined for a bias within ±0.5 K and an error of less than 2 K. High ozone dates are highlighted in red.

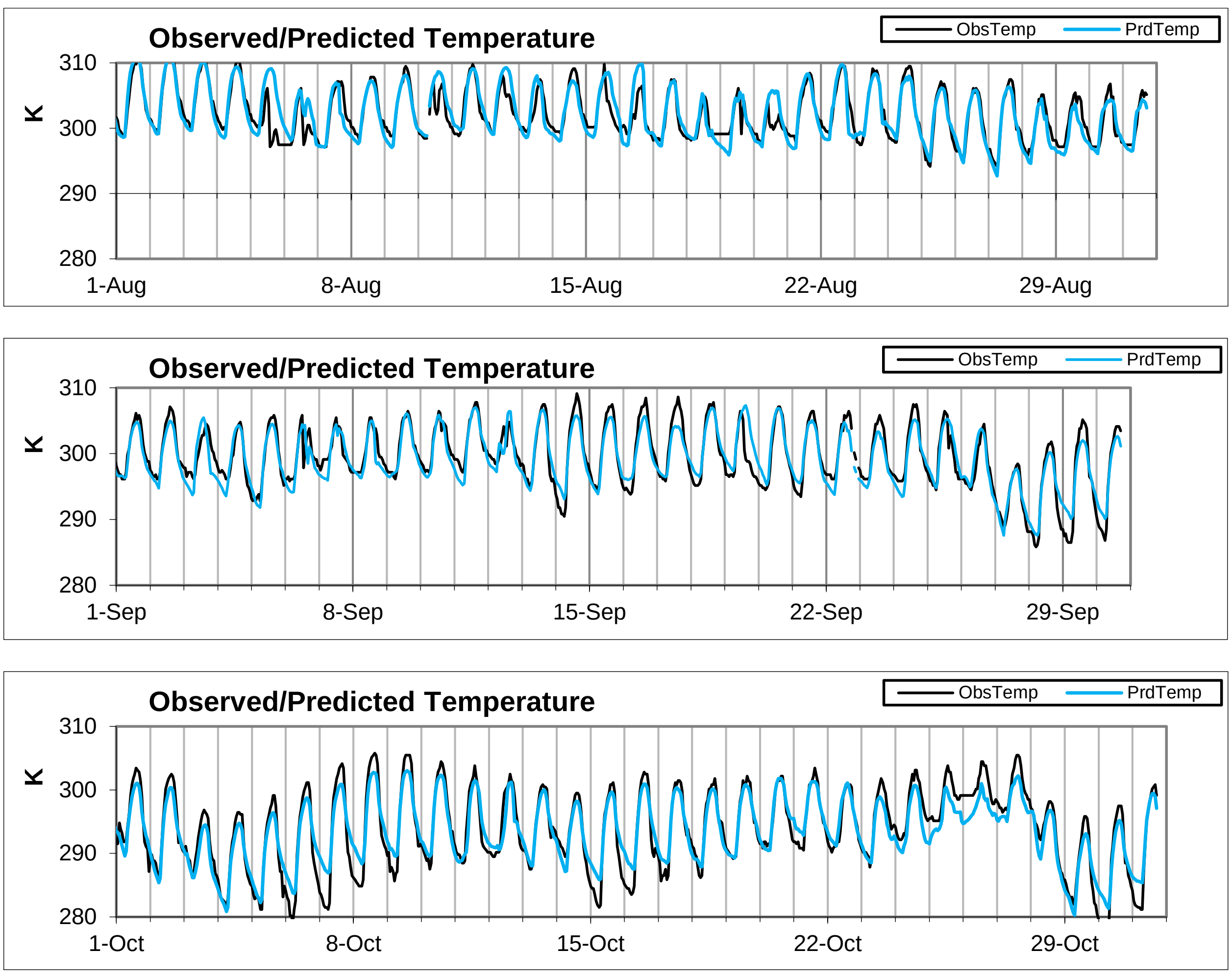



**Figure 3-12. Hourly predicted (blue) and observed (black) temperature averaged over all sites in northern Louisiana for August (top), September (middle) and October (bottom).**

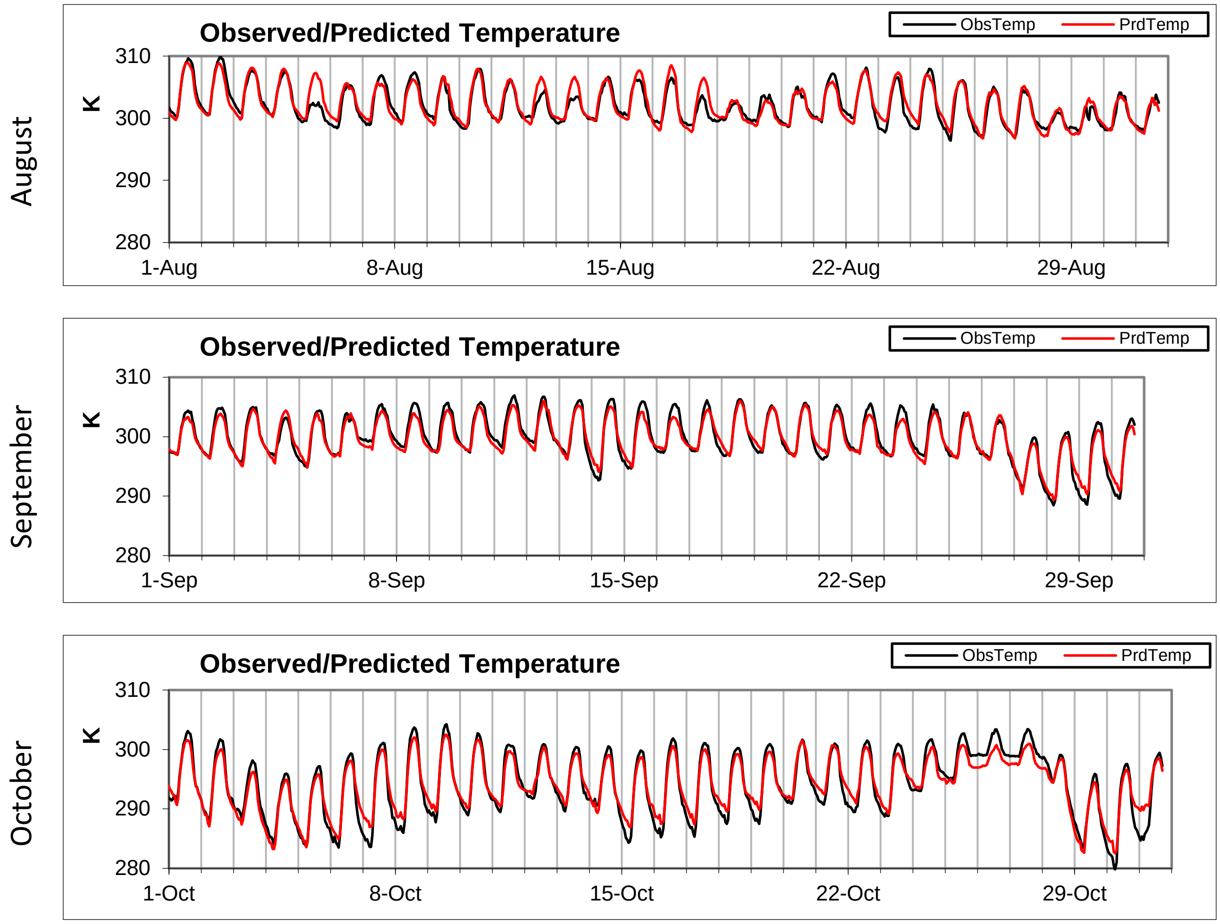



**Figure 3-13. Hourly predicted (red) and observed (black) temperature averaged over all sites in southern Louisiana for August (top), September (middle) and October (bottom).**

In both areas of Louisiana, WRF simulated larger diurnal variations in temperature in October than in August in accordance with observations. However, the predicted diurnal range in October was not as great as the observed as daytime highs were under predicted and nighttime lows were over predicted, as can be seen in both the time series and scatter plots. September daytime peaks also tended to be under predicted. WRF correctly predicted strong drops in temperature on September 27 and October 28, and smaller diurnal ranges on October 25-27, but those temperatures were under predicted.

WRF performed better in southern Louisiana, where over 90% of the predicted temperatures during the daytime hours on high ozone dates were within 2 K of the observed. In northern Louisiana, around 70 % of the hours on the episode dates were within 2 K of the observed.

Daily temperature statistics revealed somewhat scattered performance in both months in northern Louisiana. Southern Louisiana temperatures fared much better, especially in September when the daily temperature error never exceeded 2 K and the daily bias on the high

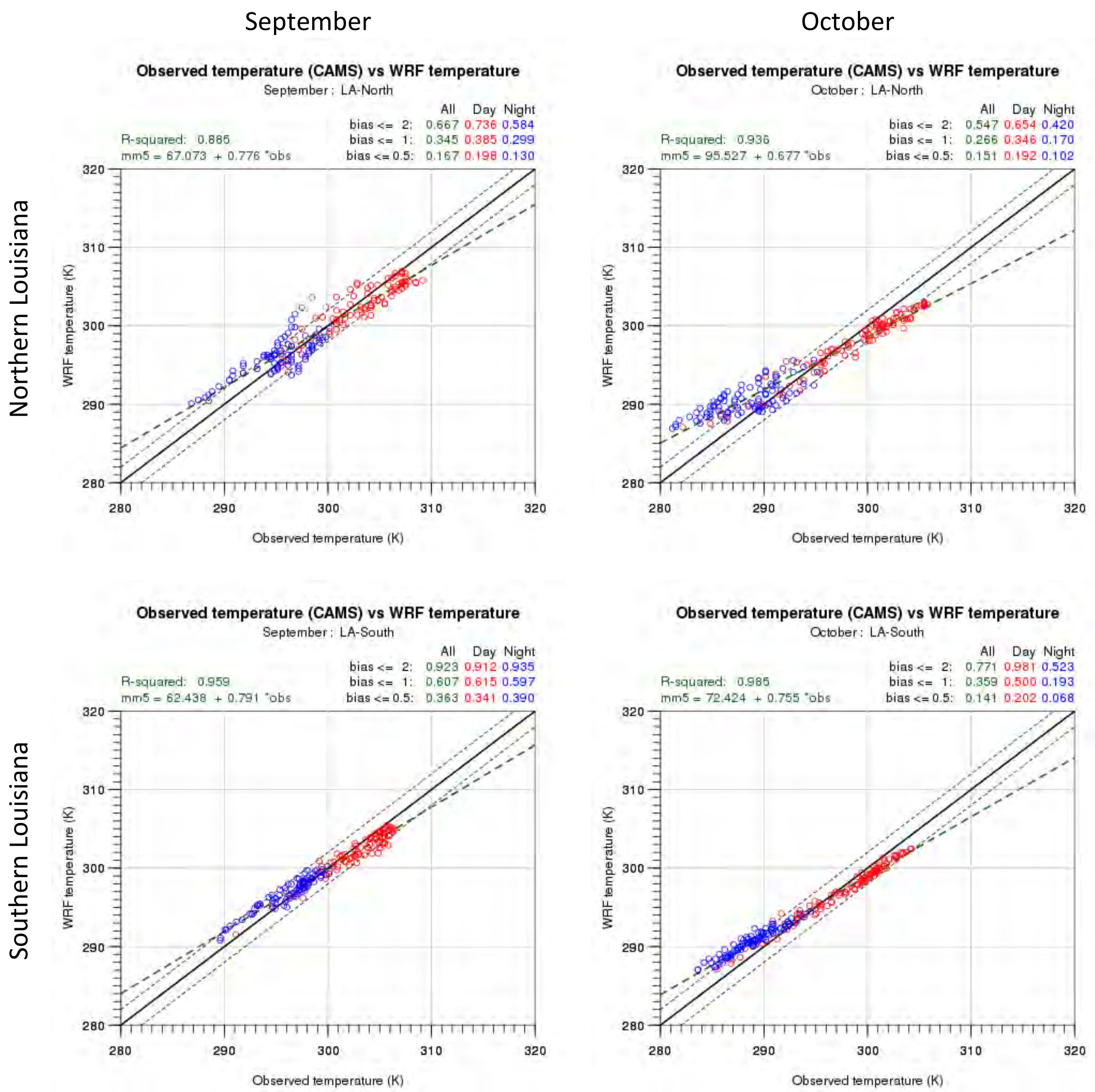



**Figure 3-14. Scatter plots of hourly predicted and observed temperature on high ozone dates during September (left) and October (right) for northern Louisiana (top) and southern Louisiana (bottom). Red circles represent daytime hours (8 AM – 6 PM CST), blue represents nighttime hours (7 PM to 7 AM). The solid black diagonal line is the 1:1 perfect correlation line; the two black dashed lines represent the ±2 K bias envelope. Statistics show the regression line and the fraction of hours when the bias is between ±.5, 1, and 2 K.**

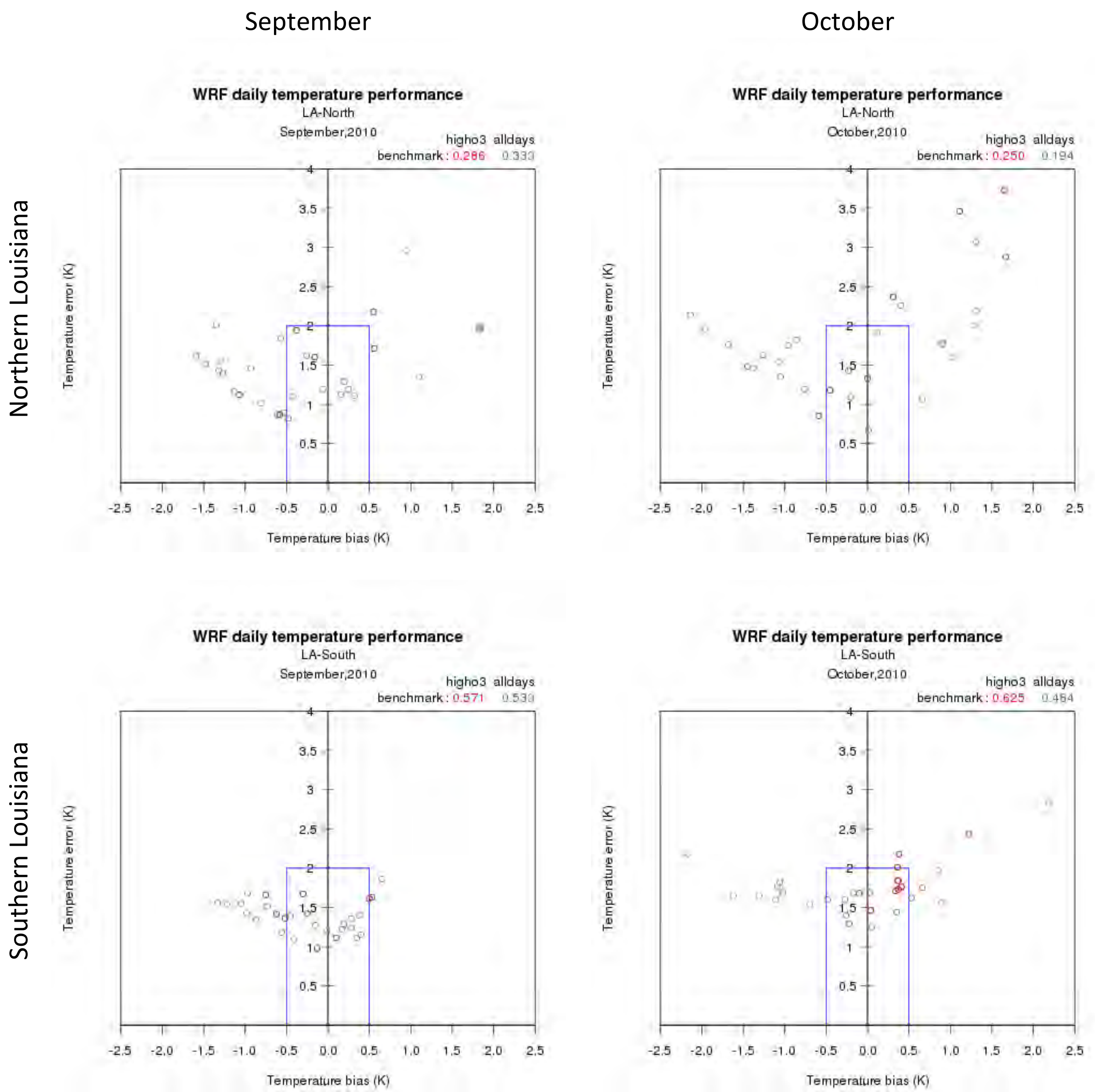



**Figure 3-15. Soccer goal plots of daily temperature bias and error. Red circles highlight the high ozone dates.**

ozone dates were inside or very close to the ±0.5 K benchmark. October daily temperature statistics met the performance goals on 5 of the 8 high ozone dates. The daily biases on these 8 dates were all positive. Overall, this temperature performance is on par with our experience using WRF in other areas of the US.

## 3.4 Precipitation

Predicted 24-hour precipitation totals were compared to precipitation analysis fields from the Advanced Hydrologic Prediction Service (AHPS), which were downloaded from http://water.weather.gov/precip/p_download_new/2010/ and reformatted to match the LDEQ 4 km modeling domain. All totals were for the 24-hour period ending at 12 UTC (6 AM CST).

Ozone production rates are greater on sunny and warm days so little or no precipitation would be expected on the high ozone dates. For the most part, little cloudiness and precipitation was predicted over Louisiana on high observed ozone days. Instead of showing multiple precipitation plots on the high ozone dates when WRF correctly predicted dry conditions across Louisiana, we focused on two high ozone dates when there was precipitation – September 13 and 16. Figure 3-16 shows spatial plots of the observed and predicted 24-hour precipitation totals for two consecutive dates to include all hours of September 13. Figure 3-17 is similar, but for September 16.

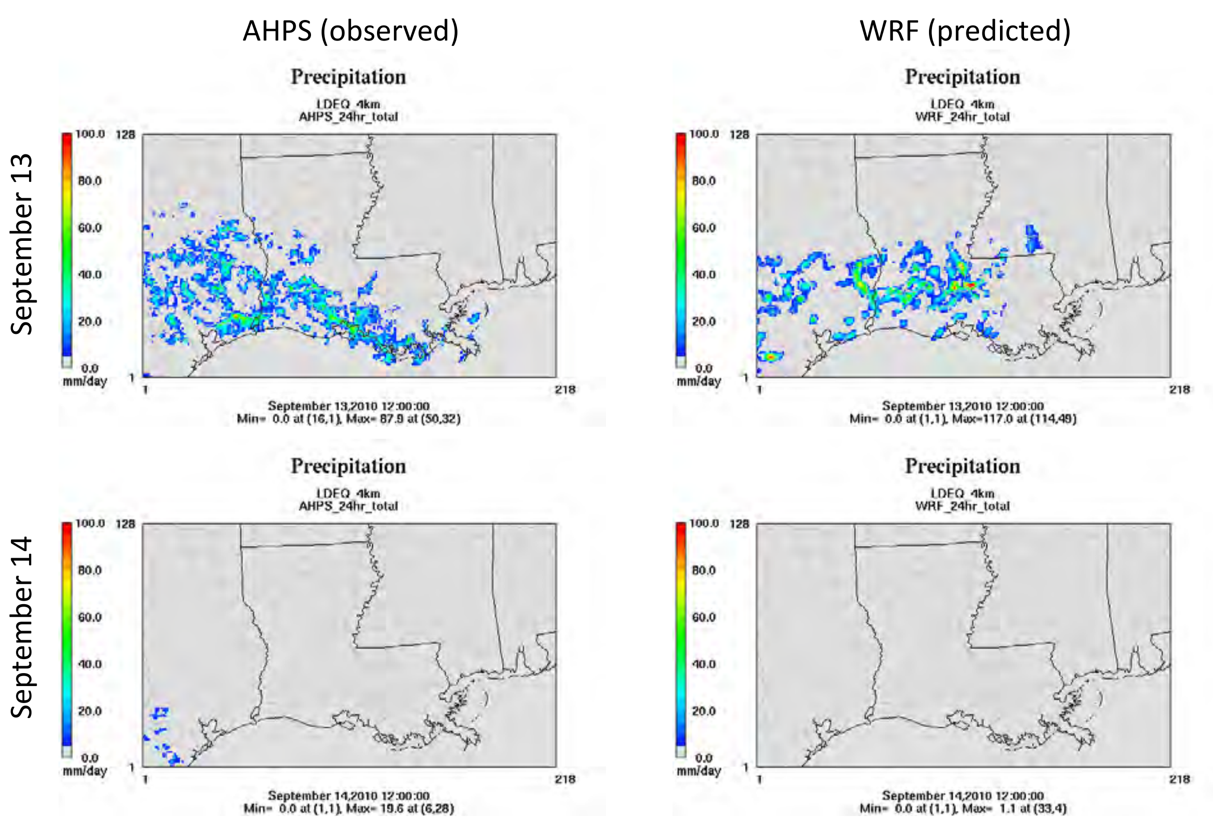



**Figure 3-16. Observed (left) and predicted (right) 24-hour precipitation ending at 6 AM CST on September 13 (top) and 14 (bottom).**

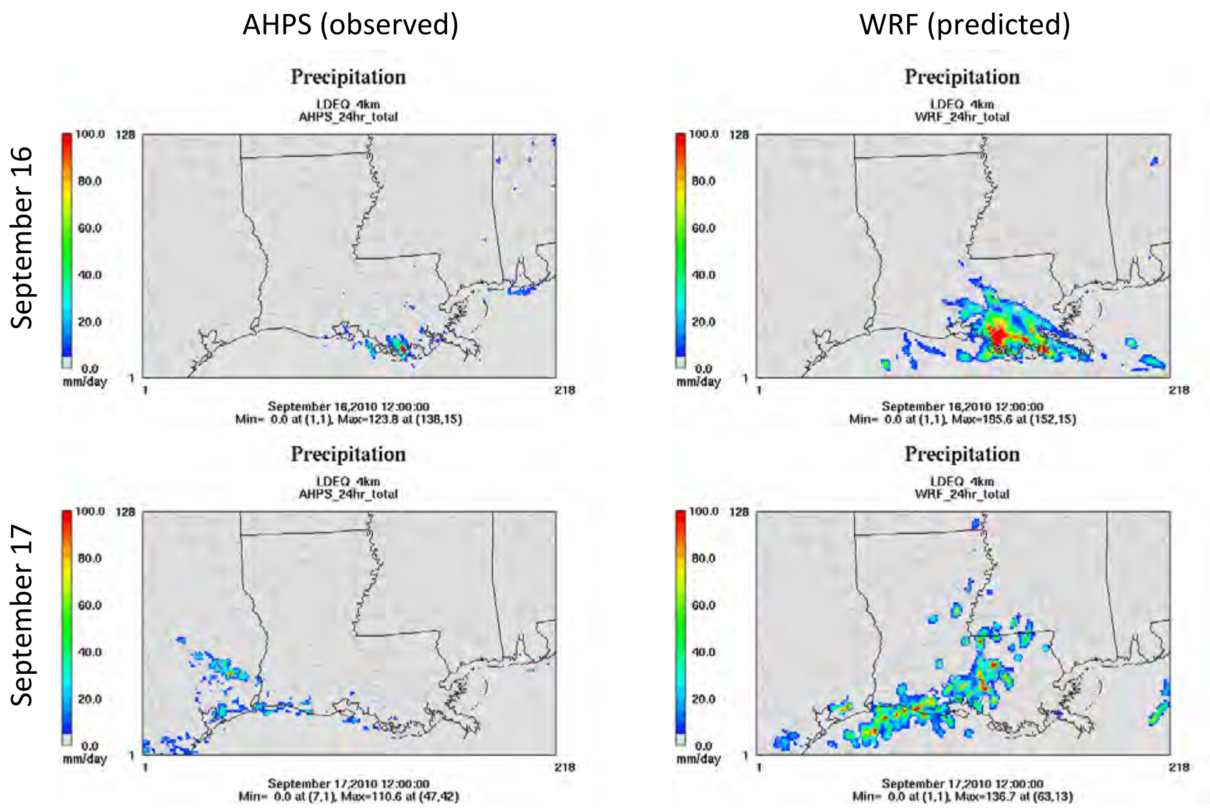



**Figure 3-17. Observed (left) and predicted (right) 24-hour precipitation ending at 6 AM CST on September 16 (top) and 17 (bottom).**

On September 13, WRF correctly predicted convective activity over southern Louisiana during the 24 hours ending at 6 AM on September 13, and dry conditions during the next 24 hours, which included all of the daytime hours of the high ozone date.

September 16 was one of the dates when WRF did not predict precipitation well over southern Louisiana. Precipitation in southeast Louisiana was over predicted during both the 24-hour periods ending at 6 AM on September 16 and 17. Fortunately, Shreveport was the only ozone monitor in Louisiana that observed 8-hour ozone greater than 75 ppb on September 16; WRF maintained dry conditions over northern Louisiana, as were observed.

Figure 3-18 compares the observed and predicted 24-hour precipitation fields on three other dates in which WRF corresponded well with the observed pattern.

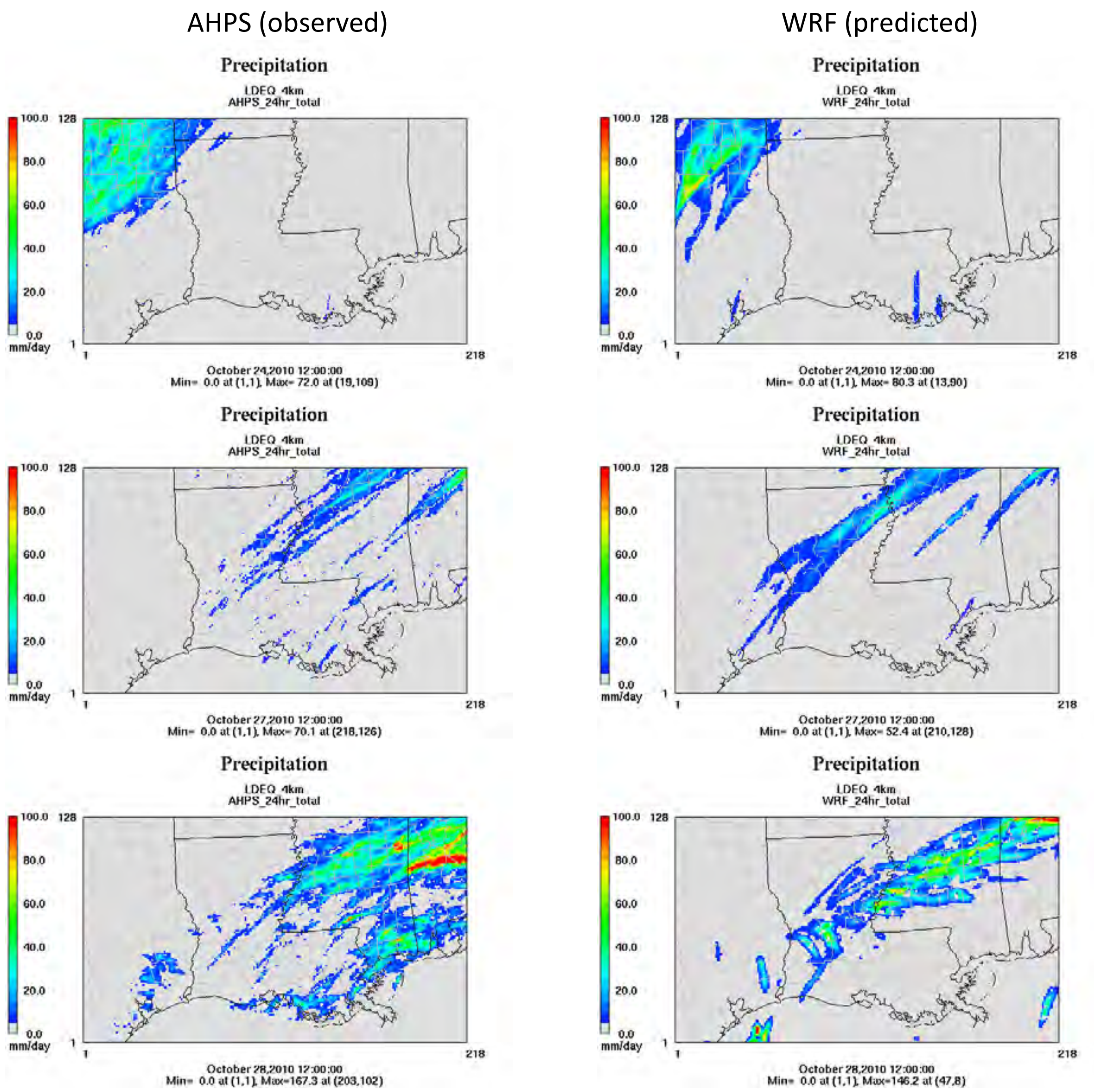



**Figure 3-18. Daily observed (left) and predicted (right) precipitation on selected episode dates (October 24, 27, and 28).**

## 3.5 Summary

A model performance evaluation was performed on the 4 km WRF meteorology, which was used to develop meteorology inputs for CAMx. Performance for wind speed, wind direction, and temperature was examined by computing hourly and daily statistics from all meteorology stations in northern and southern Louisiana. WRF performance in southern Louisiana in September was very good for all three variables. In October, the daytime wind speed and temperatures in southern Louisiana were both slightly under predicted. The former could lead to more stagnation and higher ozone, which may be compensated by slower ozone production rates due to the cooler predicted temperatures. Performance was consistently better in southern Louisiana than northern Louisiana, where daytime wind speeds and temperatures were also under estimated.

Overall, performance for wind speed and direction were markedly better than usually achieved in other WRF applications across the country. Temperature performance was on par with other applications. Precipitation performance on high ozone days was quite good, and did not exhibit the usually high degree of over prediction so often identified in past applications.

# 4.0 PHOTOCHEMICAL MODEL INPUTS

Inputs for the CAMx photochemical model were prepared for the Louisiana September-October 2010 modeling period. Inputs include emissions, meteorology, landuse, albedo-haze-ozone, photolysis rates, and initial/boundary conditions. This section describes details on the creation of all input files except the emissions, which are documented separately in Section 5.

## 4.1 Meteorology

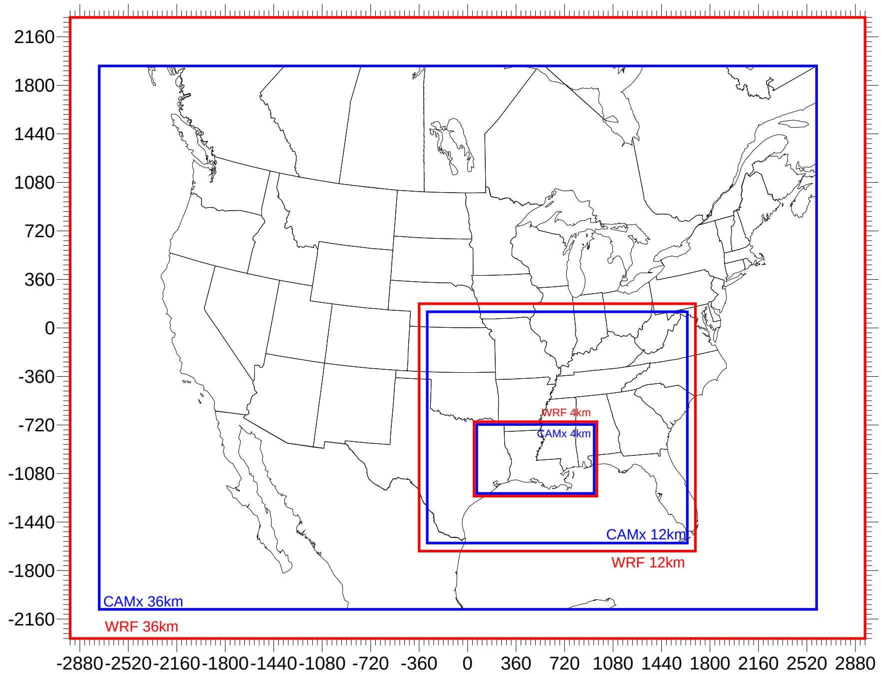
WRF version 3.3.1 was run from August through October 2010 to cover the LDEQ 36, 12, and 4 km photochemical modeling domains (Alpine, 2012). The WRF output was then used to generate CAMx meteorological input files using the WRFCAMx version 3.3 converter. The CAMx and WRF domains are shown in Figure 4-1, where the CAMx domain was at least 5 grid cells inside any of the WRF boundaries. The Lambert Conformal Projection (LCP) in WRF was the same as CAMx, where the projection center was at 40°N/97°W with true latitudes of 33°N and 45°N.

Six binary CAMx meteorological files are generated by WRFCAMx for each simulation date, which include the following hourly-varying three-dimensional fields:

- Height (m)/pressure (mb)
- Wind (as separate east-west and north-south components, m/s)
- Temperature (K)
- Vertical diffusivity ($m^2$/s)
- Humidity (ppm)
- Cloud and rain water (g/$m^3$)

A 26-category landuse file is also output, but is not used because it is derived from WRF's dominant landuse category in each grid cell. A better alternative is to create landuse files based on high-resolution land cover datasets, processed with Geographic Information System (GIS) software, from which to develop the fraction of each land cover category in each grid cell. Details on the GIS-based landuse files are provided below.

WRFCAMx was configured to time-shift the meteorology from its native Coordinated Universal Time (UTC) to Central Standard Time (CST) and extract 27 vertical layers of meteorological data up to 11 km, near the top of the troposphere, using the layer structure shown in Table 4-1. A layer averaging scheme that combined multiple WRF layers into single CAMx layers was applied to layers above 3 km to focus on the photochemical simulation in the lower to mid troposphere and to reduce computational time.




**Louisiana WRF/CAMx Modeling Domains**

CAMx
- 36 km: 148 x 112 (-2736, -2088) to (2592, 1944)
- 12 km: 161 x 143 ( -300, -1596) to (1632, 120)*
- 04 km: 218 x 128 ( 68, -1228) to ( 940, -716)*

WRF
- 36 km: 165 x 129 dot points (-2952, -2304) to (2952, 2304)
- 12 km: 172 x 154 dot points ( -360, -1656) to (1692, 180)
- 04 km: 229 x 139 dot points ( 48, -1248) to ( 960, -696)

* includes buffer cells

**Figure 4-1. Map of CAMx and WRF modeling domains.**

WRFCAMx was set to diagnose sub-grid clouds in the 36 km and 12 km domains, but not in the 4 km domain, where grid-scale convection was explicitly treated by WRF's resolved cloud microphysics algorithm.

WRFCAMx includes several methods for computing the vertical turbulent exchange coefficients (or "diffusivities", Kv). Since WRF was configured with the Mellor-Yamada-Janjic (MYJ) turbulent kinetic energy (TKE) boundary layer scheme, the MYJ TKE option was selected to compute the vertical diffusivities from the TKE fields output by WRF. The minimum Kv was set to 0.1 $m^2/s$.

An additional program (KVPATCH) is often applied to the vertical diffusivity files to enhance mixing in specific environments. Two patches within the program were applied. The first enhances the minimum Kv floor in urban areas according to the profile methodology of O'Brien (1970). This maintains low-level urban mixing in the stable nighttime hours with the lowest 200 m to account for urban heating and turbulence induced by the urban canopy. The second patch

**Table 4-1. CAMx and WRF vertical layer structures.**

| WRF Meteorological Model | | | | CAMx Air Quality Model | | |
|---|---|---|---|---|---|---|
| Layer Index | Sigma | Height (m) | Depth (m) | Layer Index | Height (m) | Depth (m) |
| 43 | 0.000 | 18872 | 736 | | | |
| 42 | 0.010 | 18135 | 970 | | | |
| 41 | 0.025 | 17165 | 1110 | | | |
| 40 | 0.045 | 16055 | 959 | | | |
| 39 | 0.065 | 15096 | 1045 | | | |
| 38 | 0.090 | 14050 | 918 | | | |
| 37 | 0.115 | 13132 | 975 | | | |
| 36 | 0.145 | 12157 | 869 | | | |
| 35 | 0.175 | 11288 | 909 | 27 | 11288 | 2678 |
| 34 | 0.210 | 10379 | 931 | | | |
| 33 | 0.250 | 9449 | 839 | | | |
| 32 | 0.290 | 8610 | 765 | 26 | 8610 | 2044 |
| 31 | 0.330 | 7845 | 704 | | | |
| 30 | 0.370 | 7140 | 574 | | | |
| 29 | 0.405 | 6566 | 540 | 25 | 6566 | 1050 |
| 28 | 0.440 | 6026 | 510 | | | |
| 27 | 0.475 | 5516 | 484 | 24 | 5516 | 879 |
| 26 | 0.510 | 5033 | 396 | | | |
| 25 | 0.540 | 4637 | 380 | 23 | 4637 | 745 |
| 24 | 0.570 | 4258 | 365 | | | |
| 23 | 0.600 | 3893 | 352 | 22 | 3893 | 691 |
| 22 | 0.630 | 3541 | 339 | | | |
| 21 | 0.660 | 3202 | 328 | 21 | 3202 | 328 |
| 20 | 0.690 | 2874 | 317 | 20 | 2874 | 317 |
| 19 | 0.720 | 2556 | 307 | 19 | 2556 | 307 |
| 18 | 0.750 | 2249 | 249 | 18 | 2249 | 249 |
| 17 | 0.775 | 2000 | 243 | 17 | 2000 | 243 |
| 16 | 0.800 | 1757 | 237 | 16 | 1757 | 237 |
| 15 | 0.825 | 1520 | 232 | 15 | 1520 | 232 |
| 14 | 0.850 | 1288 | 136 | 14 | 1288 | 136 |
| 13 | 0.865 | 1152 | 135 | 13 | 1152 | 135 |
| 12 | 0.880 | 1017 | 133 | 12 | 1017 | 133 |
| 11 | 0.895 | 884 | 131 | 11 | 884 | 131 |
| 10 | 0.910 | 753 | 86 | 10 | 753 | 86 |
| 9 | 0.920 | 667 | 86 | 9 | 667 | 86 |
| 8 | 0.930 | 581 | 85 | 8 | 581 | 85 |
| 7 | 0.940 | 496 | 84 | 7 | 496 | 84 |
| 6 | 0.950 | 412 | 84 | 6 | 412 | 84 |
| 5 | 0.960 | 328 | 83 | 5 | 328 | 83 |
| 4 | 0.970 | 245 | 82 | 4 | 245 | 82 |
| 3 | 0.980 | 163 | 82 | 3 | 163 | 82 |
| 2 | 0.990 | 81 | 49 | 2 | 81 | 49 |
| 1 | 0.996 | 32 | 32 | 1 | 32 | 32 |

enhances vertical diffusivities through the depth of convective clouds capping the daytime boundary layer, which is often suppressed within models such as WRF.

## 4.2 Landuse

Landuse within CAMx is specified through a binary input file (SURFACE) that contains a time-invariant two-dimensional gridded field of landuse distribution. For the Zhang dry deposition scheme, the fractional distributions of 26 landuse categories and two-dimensional fields of leaf area index (LAI) are specified for each grid cell. These are used to define surface resistances for dry deposition calculations and to set default surface roughness lengths. These landuse categories are described in Table 4-2 for the Zhang dry deposition scheme.

The landuse/landcover (LULC) data were extracted from the North America Land Cover (NALC) database for the year 2000 (Latifovic, et al. 2002). NALC was developed jointly by the Natural Resources Canada - Canada Centre for Remote Sensing, and the USGS EROS Data Center as part of the larger Global Land Cover 2000 project implemented by the Global Vegetation Monitoring Unit, Joint Research Center (JRC) of the European Commission. The North American database was compiled using satellite data during the 2000 growing season at a spatial resolution of 1-km. The data are available as GIS raster datasets for each continent, in a geodetic coordinate system and can be obtained from the project website at http://edc2.usgs.gov/glcc/nadoc2_0.php. The NALC land use classification scheme includes 29 separate categories as presented in Table 4-3. The landuse classes available in the source GIS database were cross referenced to those required for the Zhang dry deposition schemes used by CAMx. Table 4-4 shows the cross references used for the Zhang scheme.

Gridded LAI data are an optional input for use with the Zhang dry deposition scheme in CAMx. We derived gridded LAI inputs from the Model of Emissions of Gases and Aerosols from Nature (MEGAN) biogenic emissions model. The data are provided as un-projected global 30 arc second (~1-km horizontal resolution) GIS raster datasets. LAI is defined as the ratio of total upper leaf surface area divided by the surface area of the land on which the vegetation grows. The LAI data available with the MEGAN databases represent average values over each raster, in units of $m^2/m^2$ and are available as monthly averaged datasets for calendar year 2001. The LAI data can be obtained as ArcGIS raster GRID files from http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm.

A suite of GIS and Perl-based processors were used to prepare landcover and LAI input datasets for CAMx. Arc Macro Language (AML) scripts were used to process the raster-based and vector-based GIS data and export text datasets for subsequent processing with Perl scripts and FORTRAN programs. User-defined options are used to specify various parameters including the definition of output modeling domains, map projection parameters, and the input LULC and MEGAN LAI databases. The CAMx landuse file was prepared for the LDEQ 36/12/4km grids. Figure 4-2 shows a spatial map displaying the dominant land cover category for each grid cell in the 4 km domain.

**Table 4-2. CAMx landuse categories for the Zhang dry deposition scheme.**

| Category Number | Land Cover Category |
|---|---|
| 1 | Water |
| 2 | Ice |
| 3 | Inland Lake |
| 4 | Evergreen Needleleaf Trees |
| 5 | Evergreen Broadleaf Trees |
| 6 | Deciduous Needleleaf Trees |
| 7 | Deciduous Broadleaf Trees |
| 8 | Tropical Broadleaf Trees |
| 9 | Drought Deciduous Trees |
| 10 | Evergreen Broadleaf Shrubs |
| 11 | Deciduous Shrubs |
| 12 | Thorn Shrubs |
| 13 | Short Grass and Forbs |
| 14 | Long Grass |
| 15 | Crops |
| 16 | Rice |
| 17 | Sugar |
| 18 | Maize |
| 19 | Cotton |
| 20 | Irrigated Crops |
| 21 | Urban |
| 22 | Tundra |
| 23 | Swamp |
| 24 | Desert |
| 25 | Mixed Wood Forests |
| 26 | Transitional Forest |

**Table 4-3. NALC LULC classification.**

| Code | Description |
|---|---|
| 1 | Tropical or Sub-tropical Broadleaved Evergreen Forest - Closed Canopy |
| 2 | Tropical or Sub-tropical Broadleaved Deciduous Forest - Closed Canopy |
| 3 | Temperate or Sub-polar Broadleaved Deciduous Forest - Closed Canopy |
| 4 | Temperate or Sub-polar Needleleaved Evergreen Forest - Closed Canopy |
| 5 | Temperate or Sub-polar Needleleaved Evergreen Forest - Open Canopy |
| 6 | Temperate or Sub-polar Needleleaved Mixed Forest - Closed Canopy |
| 7 | Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Closed Canopy |
| 8 | Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Open Canopy |
| 9 | Temperate or Subpolar Broadleaved Evergreen Shrubland - Closed Canopy |
| 10 | Temperate or Subpolar Broadleaved Deciduous Shrubland - Open Canopy |
| 11 | Temperate or Subpolar Needleleaved Evergreen Shrubland - Open Canopy |
| 12 | Temperate or Sub-polar Mixed Broadleaved and Needleleaved Dwarf-Shrubland - Open Canopy |
| 13 | Temperate or Subpolar Grassland |
| 14 | Temperate or Subpolar Grassland with a Sparse Tree Layer |
| 15 | Temperate or Subpolar Grassland with a Sparse Shrub Layer |
| 16 | Polar Grassland with a Sparse Shrub Layer |
| 17 | Polar Grassland with a Dwarf-Sparse Shrub Layer |
| 18 | Cropland |
| 19 | Cropland and Shrubland/woodland |
| 20 | Subpolar Needleleaved Evergreen Forest Open Canopy - lichen understory |
| 21 | Unconsolidated Material Sparse Vegetation (old burnt or other disturbance) |
| 22 | Urban and Built-up |
| 23 | Consolidated Rock Sparse Vegetation |
| 24 | Water bodies |
| 25 | Burnt area (resent burnt area) |
| 26 | Snow and Ice |
| 27 | Wetlands |
| 28 | Herbaceous Wetlands |
| 29 | Tropical or Sub-tropical Broadleaved Evergreen Forest - Open Canopy |

**Table 4-4. LULC mapping between the 29 NALC categories and the 26 CAMx categories.**

| GRID-CODE | CAMx-CODE | Description |
|---|---|---|
| 1 | 8 | Tropical or Sub-tropical Broadleaved Evergreen Forest - Closed Canopy |
| 2 | 8 | Tropical or Sub-tropical Broadleaved Deciduous Forest - Closed Canopy |
| 3 | 7 | Temperate or Sub-polar Broadleaved Deciduous Forest - Closed Canopy |
| 4 | 4 | Temperate or Sub-polar Needleleaved Evergreen Forest - Closed Canopy |
| 5 | 4 | Temperate or Sub-polar Needleleaved Evergreen Forest - Open Canopy |
| 6 | 25 | Temperate or Sub-polar Needleleaved Mixed Forest - Closed Canopy |
| 7 | 25 | Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Closed Canopy |
| 8 | 25 | Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Open Canopy |
| 9 | 10 | Temperate or Subpolar Broadleaved Evergreen Shrubland - Closed Canopy |
| 10 | 11 | Temperate or Subpolar Broadleaved Deciduous Shrubland - Open Canopy |
| 11 | 10 | Temperate or Subpolar Needleleaved Evergreen Shrubland - Open Canopy |
| 12 | 10 | Temperate or Sub-polar Mixed Broadleaved and Needleleaved Dwarf-Shrubland - Open Canopy |
| 13 | 14 | Temperate or Subpolar Grassland |
| 14 | 14 | Temperate or Subpolar Grassland with a Sparse Tree Layer |
| 15 | 13 | Temperate or Subpolar Grassland with a Sparse Shrub Layer |
| 16 | 22 | Polar Grassland with a Sparse Shrub Layer |
| 17 | 22 | Polar Grassland with a Dwarf-Sparse Shrub Layer |
| 18 | 15 | Cropland |
| 19 | 15 | Cropland and Shrubland/woodland |
| 20 | 4 | Subpolar Needleleaved Evergreen Forest Open Canopy - lichen understory |
| 21 | 13 | Unconsolidated Material Sparse Vegetation (old burnt or other disturbance) |
| 22 | 21 | Urban and Built-up |
| 23 | 24 | Consolidated Rock Sparse Vegetation |
| 24 | 1 | Water bodies |
| 25 | 24 | Burnt area (resent burnt area) |
| 26 | 2 | Snow and Ice |
| 27 | 23 | Wetlands |
| 28 | 23 | Herbaceous Wetlands |
| 29 | 10 | Tropical or Sub-tropical Broadleaved Evergreen Forest - Open Canopy |

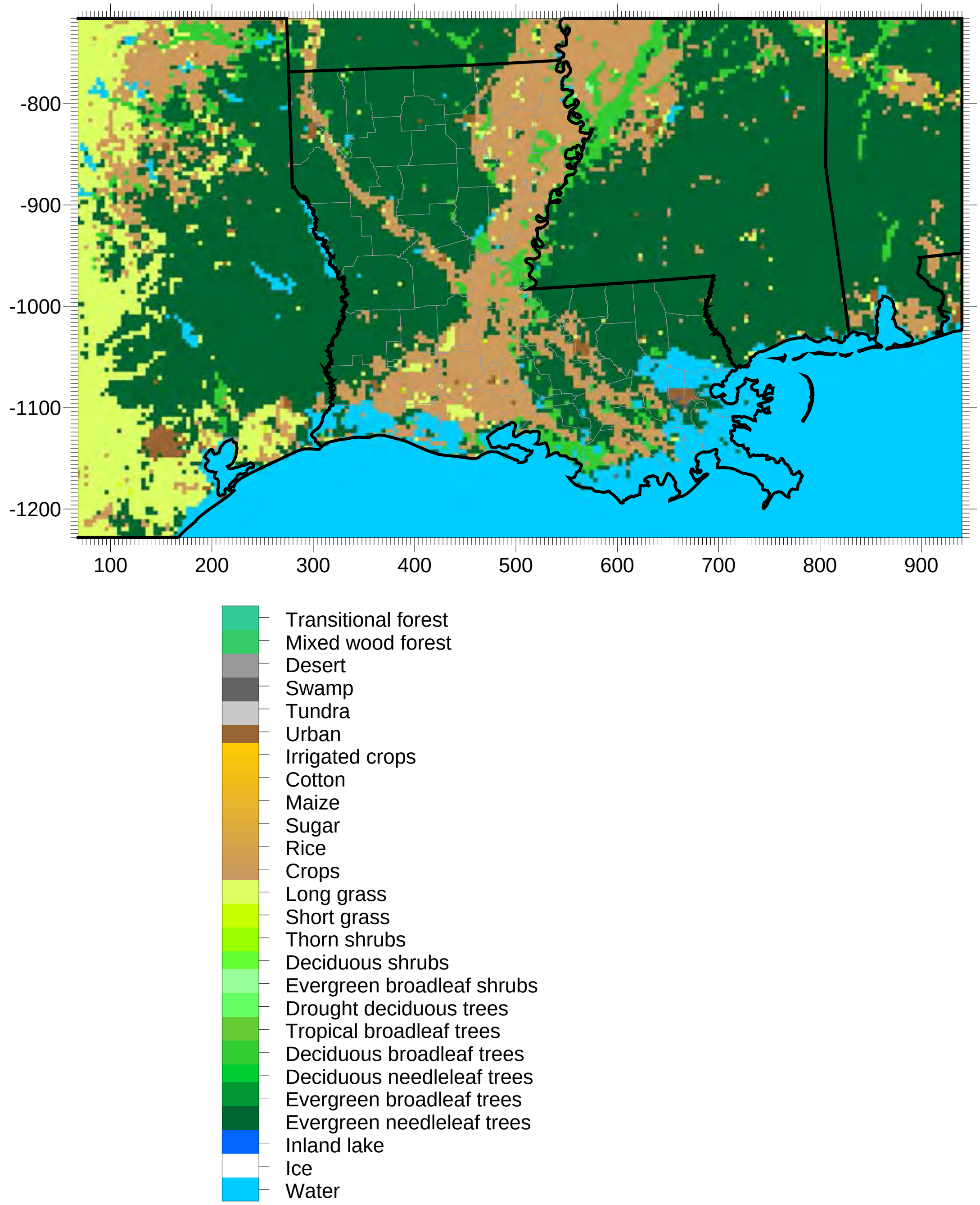



**Figure 4-2. Dominant landuse type in each grid cell of the 4 km CAMx domain.**

## 4.3 Albedo-Haze-Ozone

The CAMx preprocessor, AHOMAP version 4, was used to create a CAMx text input file containing gridded surface albedo, total atmospheric column haze opacity, and total atmospheric ozone column data. The program reads in CAMx landuse files for all domains to be modeled and daily Ozone Monitoring Instrument (OMI) data in 1 degree resolution, which can be downloaded for each episode date from http://ozoneaq.gsfc.nasa.gov/OMIOzone.md. All daily ozone column datasets for each month of the episode were run together to yield one albedo-haze-ozone file per month. For haze opacity, a default uniform field was specified representing a typical continental aerosol loading. Optional fields such as snow cover, surface roughness, and drought stress were not added.

## 4.4 Clear-Sky Photolysis Rates

Version 4.8 of the TUV radiative transfer model, developed by the National Center for Atmospheric Research (NCAR), reads the ranges of albedo, haze opacity and ozone column and creates a lookup table of clear-sky photolysis rates for a range of heights above the ground and solar zenith angles. The TUV program was run for each month in the modeling period to develop rates for the specific photolysis reactions defined by the Carbon Bond version 6 (CB6) and Carbon Bond 2005 (CB05) chemical mechanism. The photolysis rates are internally adjusted within CAMx for hourly cloud conditions within each grid column.

## 4.5 Initial and Boundary Conditions

Initial conditions are used to represent an initial three-dimensional concentration distribution throughout the master grid from which the simulation starts. Boundary conditions are used to represent concentration patterns outside of the outer CAMx modeling domain that are subsequently transported into the grid system. Data for initial and boundary conditions were derived from the output of the global Model for Ozone and Related chemical Tracers, version 4 (MOZART-4). MOZART outputs are available from http://www.acd.ucar.edu/wrf-chem/mozart.shtml and were downloaded for the 2010 episode.

MOZART was run with 1.9 by 2.5 degree horizontal resolution and 56 vertical layers, and output data in 6-hour intervals. By comparison, MOZART data used for the 2006 Baton Rouge ozone simulation had 2.8 by 2.8 degree resolution with 28 vertical layers.

Native MOZART-4 output data in netCDF format were first converted to IOAPI format using the NCF2IOAPI program. Then, the MOZART2CAMx program horizontally and vertically interpolated the data onto the CAMx domain and remapped the chemical species to CB6 and CB05 speciation. Daily boundary condition files were generated for each date to be simulated by CAMx with the assumption that each MOZART 6-hourly time period was representative of the next six hours in CAMx. Boundary conditions were then time shifted from UTC to CST; initial conditions, based on MOZART fields at 6 AM UTC (midnight CST) on August 17, did not need to be time shifted.

# 5.0 DEVELOPMENT OF 2010 BASE YEAR EMISSIONS

Emission estimates were prepared for the September-October 2010 Base Year modeling period. Details on the creation of certain emission input files for the CAMx photochemical model are described in this section, specifically including Louisiana and Gulf of Mexico anthropogenic sources, and biogenic and fire sources throughout the North American modeling domain. Alpine Geophysics developed anthropogenic emission estimates for the remainder of the North American modeling domain.

## 5.1 Introduction

A key component of an ozone modeling study is the underlying emissions inventory. Spatially, temporally and chemically resolved estimates of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) from sources such as industries, electric generating units (EGUs), on-road motor vehicles, and vegetation are critical inputs to an air quality model. This section documents the development of certain components of the 2010 Base Year emission inventories, and the preparation of CAMx-ready emission inputs for the 4, 12, and 36 km modeling domains (Figure 4-1).

Emphasis was placed on developing emissions estimates within the State of Louisiana (LA). EPS3 was used to convert the LA emission inventory into the hourly, chemically speciated, and gridded formats needed by CAMx. Other emission modeling tools were used to estimate emissions from specific categories; MEGAN and BEIS for biogenics, MOVES/CONCEPT for on-road, NMIM for non-road sources, and FINN for wildfires, and agricultural/prescribed burning.

EPS3 requires emission inventory files and support data (cross-reference files, spatial surrogates, temporal and speciation profiles) as input. Area and point source emissions in Louisiana were prepared by ERG, working closely with the LDEQ. Day- and hour-specific 2010 NOx emissions for sources throughout the modeling domain that are subject to continuous emissions monitoring (CEM) under the Title V Acid Rain Program (ARP) were extracted from the EPA's database and were reconciled against, and supplemented with, data provided by LDEQ. Gulf-wide offshore emissions were developed by ERG from the BOEM 2008 Gulf-wide Emission Inventory Study. Biogenic and fire emissions were estimated for all three modeling grids for each hour of each day of the September and October 2010 modeling period.

## 5.2 Emissions in Louisiana

EPS3 was set up to process criteria pollutant emissions into the CAMx configuration using the Carbon Bond version 6 (CB6) chemical mechanism. Emissions for the following model species were generated:

| | |
|---|---|
| Nitrogen oxides: | NO, NO2, HONO |
| Volatile organic compounds: | ACET, ALD2, ALDX, BENZ, ETH, ETHA, ETHY, ETOH, FORM, IOLE, ISOP, KET, MEOH, OLE, PAR, PROP,TERP, TOL, XYL |
| Carbon monoxide: | CO |

Speciation to CB6 compounds was performed by applying standard source-specific profiles derived from the EPA SPECIATE 4.3 database. These profiles were assigned to each of the source categories contained in the raw emissions inventory files using default EPA cross-references. Because of its backward-compatibility, CB6 speciation can be subsequently reverted back to CB05 by combining certain CB6-specific VOCs to the generic alkane "PAR" as follows:

BENZ $\rightarrow$ 1 PAR (+ 5 "non-reactive" moles in compounds that are ignored);
PROP $\rightarrow$ 1.5 PAR (+ 1.5 "non-reactive")
ACET $\rightarrow$ 3 PAR
ETHY $\rightarrow$ 1 PAR
KET $\rightarrow$ 1 PAR,

where emissions for the five CB6 species listed above are set to zero after the conversion.

Temporal allocation for most source categories was performed by applying default EPA seasonal, monthly, day-of-week, and hourly profiles and cross-references for the inventory components.

Gridding surrogates were developed for the 4 km modeling domain using the EPA Spatial Allocator tool that is available from http://www.cmascenter.org/index.cfm. Typical surrogate types were created including: population, various road types and other transportation networks, agriculture, residential, commercial and industrial land, retail, and water bodies. The EPA Spatial Allocator tool creates surrogates formatted for the SMOKE emissions model, which were reformatted to the EPS3 requirements. The surrogate list used for spatial allocation of LA emissions is listed in Table 5-1.

EPS3 generated model-ready hourly point, area, non-road mobile, and on-road mobile emissions of CB6 compounds on the 36/12/4 km grid system. Annual and ozone season emission estimates were used to develop a representative weekday, Saturday and Sunday. Day specific estimates were developed for on-road mobile, acid rain point, and fire sources. The remainder of this sub-section details the emissions processing by source category.

### 1.1.1 Point Sources

The 2010 point source emissions were based upon a point source inventory provided by LDEQ (2012a). In consultation with LDEQ staff, the modeling team partitioned the inventory into two groups: those electricity generating units that are subject to the EPA's Clean Air Markets Division (CAMD) Acid Rain Program (ARP), and all other point sources.

As required by law, units subject to ARP must submit their hourly nitrogen oxide (NOx) and sulfur oxide (SOx) emissions data to the EPA. Because these data were reported on an hourly basis, these data are considered to provide a more accurate representation of the temporal distribution of emissions compared to annual emission estimates. In order to avoid double-counting, all ARP units and their associated emissions were removed from LDEQ's point source

**Table 5-1. Spatial surrogate codes developed for Louisiana emissions processing.**

| SURROGATE | SURROGATE CODE | SURROGATE | SURROGAT E CODE |
|---|---|---|---|
| Population | 100 | Commercial, Industrial and Institutional | 520 |
| Housing | 110 | Golf Courses, Institutional, Industrial and Commercial | 525 |
| Urban Population | 120 | Single Family Residential | 527 |
| Rural Population | 130 | Residential - High Density | 530 |
| Housing Change | 137 | Residential + Commercial + Industrial + Institutional + Government | 535 |
| Housing Change and Population | 140 | Retail Trade | 540 |
| Residential Heating - Natural Gas | 150 | Personal Repair | 545 |
| Residential Heating - Wood | 160 | Retail Trade plus Personal Repair | 550 |
| 0.5 Residential Heating - Wood plus 0.5 Low Intensity Residential | 165 | Professional/Technical plus General Government | 555 |
| Residential Heating - Distillate Oil | 170 | Hospital | 560 |
| Residential Heating - Coal | 180 | Medical Office/Clinic | 565 |
| Residential Heating - LP Gas | 190 | Heavy and High Tech Industrial | 570 |
| Urban Primary Road Miles | 200 | Light and High Tech Industrial | 575 |
| Rural Primary Road Miles | 210 | Food, Drug, Chemical Industrial | 580 |
| Urban Secondary Road Miles | 220 | Metals and Minerals Industrial | 585 |
| Rural Secondary Road Miles | 230 | Heavy Industrial | 590 |
| Total Road Miles | 240 | Light Industrial | 595 |
| Urban Primary plus Rural Primary | 250 | Industrial plus Institutional plus Hospitals | 596 |
| 0.75 l Roadway Miles plus 0.25 Population | 255 | Gas Stations | 600 |
| Total Railroad Miles | 260 | Refineries and Tank Farms | 650 |
| Class 1 Railroad Miles | 270 | Refineries ,Tank Farms, and Gas Stations | 675 |
| Class 2 and 3 Railroad Miles | 280 | Airport Points | 710 |
| Low Intensity Residential | 300 | Airport Areas | 700 |
| Total Agriculture | 310 | Military Airports | 720 |
| Orchards/Vineyards | 312 | Navigable Waterway Miles | 807 |
| Forest Land | 320 | Marine Ports | 800 |
| Strip Mines/Quarries | 330 | Navigable Waterway Activity | 810 |
| Land | 340 | Golf Courses | 850 |
| Water | 350 | Mines | 860 |
| Rural Land Area | 400 | Wastewater Treatment Facilities | 870 |
| Commercial Land | 500 | Drycleaners | 880 |
| Industrial Land | 505 | Commercial Timber | 890 |
| Commercial plus Industrial | 510 | Gulf of Mexico non-platform | 990 |
| Commercial plus Institutional Land | 515 | | |

database.  However, only ARP units were removed at any given facility; any non-ARP units were left in the database unchanged.

The 2010 hourly emissions data for all units subject to ARP were downloaded from U.S. EPA's Air Markets Program Data website (EPA, 2012).  Because only NOx and SOx emissions data were reported to ARP, VOC and CO ratios were used to estimate hourly VOC and CO emissions.  Annual unit-specific VOC-to-NOx ratios were calculated using data from LDEQ's point source database and then applied to the hourly NOx emissions for ARP units to estimate hourly VOC emissions; a similar CO-to-NOx ratio was developed to estimate hourly CO emissions for ARP units.

Emissions from the LDEQ point source database for all other non-ARP point sources were incorporated into the inventory without any adjustments.  However, some basic quality assurance checks were performed on the point source data, including review of the largest emitters, review of important sectors such as electricity generation and refineries, and visual review of plotted stack coordinate data to ensure that all coordinates were located within the State of Louisiana.  The 2010 ARP hourly emissions data was compared with the annual emission estimates contained in the LDEQ point source inventory database.  In general, the summation of the 2010 hourly emissions data for the units subject to ARP equaled the annual estimates.  However, in a few instances the summation of the 2010 hourly emissions data slightly exceeded the annual estimates.  In these cases, it was assumed that the hourly emissions reported to EPA were correct.

Non-ARP point sources report annual emissions as tons per year (TPY).  These sources were temporally allocated to month, day of week, and hours, according to source category code using default EPA profiles and cross-reference files.  All point source emissions were speciated to CB6 compounds using default EPA profiles and cross-reference files.  All acid rain point sources were treated as elevated sources.  The non-ARP points were processed as elevated sources when stack information indicated a sufficient plume rise to warrant elevated treatment.  All point source emissions were located in the CAMx grid system according to their reported coordinates.

### 5.2.1 Area Sources

Area sources comprise stationary sources that are not identified as individual points and are distributed over a large spatial extent (i.e. parish).  Annual parish-level area source emissions inventory data were provided by the LDEQ (2012b).  The inventory data were taken from the 2009 attainment demonstration for nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC).  Because of the proximity of the year for which data were obtained, it was decided that 2009 area source estimates would be used for 2010 without any projection.  All data were checked for completeness (e.g., combustion categories had NOx, CO, and VOC emissions; solvent evaporation categories had VOC; all parishes had solvent evaporation and fuel combustion categories; etc.).

The VOC emissions were speciated to CB6 compounds. All sources were temporally allocated to month of year, day of week and hour of day using the EPA defaults by source category. The emissions were spatially allocated to the CAMx grid system by mapping source category code to a spatial surrogate code using the default EPA cross-reference file.

### 5.2.2 On-Road Mobile Sources

On-road mobile emissions are pollutants emitted from highway motor vehicles during both driving operation and while parked. However, emissions from the refueling of motor vehicles at service stations (Stage 2 Refueling) are included under area sources. Two models were used to develop the on-road mobile inventory for the full state of Louisiana:

- MOtor Vehicle Emission Simulator (MOVES);
- CONsolidated Community Emissions Processor Tool, Motor Vehicle (CONCEPT MV).

#### 5.2.2.1 MOVES

This EPA regulatory model was run in the mode referred to as Emission Rate Calculation Type for individual Louisiana parishes using the County Scale/Domain with local data inputs provided by the LDEQ. Under this particular MOVES configuration, the model outputs emission factor tables in units of grams/mile or grams/vehicle/hour, depending on emission process (e.g. start or running). MOVES was run under a wide range of conditions to produce lookup tables so that relatively few MOVES runs produced emission factors applicable to many hours and grid cells. The model and database version used for this work were MOVES2010a and movesdb20100830, respectively.

The important MOVES inputs for emission factor calculations include temperature, humidity, fuels, inspection and maintenance (I/M) programs, vehicle fleet age distribution, and the ratio of vehicle-miles traveled (VMT) to vehicle population. The full range of meteorological conditions input to MOVES was determined by an analysis of WRF meteorological data using ENVIRON's MET2MOVES tool. LDEQ provided the other MOVES input data, including:

- Age Distribution, Fuels and I/M programs, by parish
- Annual average day VMT by road type and parish
- Vehicle population by parish for four source types:
    1. Motorcycle
    2. Passenger Car
    3. Passenger Truck
    4. Light Commercial Truck

After analysis of the MOVES input data, three distinct groups of parishes were selected due to their unique combinations of age distribution, fuel properties, and I/M programs. Table 5-2 shows the assignment of parish to the three representative parishes.

**Table 5-2. Representative Louisiana parish groups for MOVES model runs.**

| East Baton Rouge Parish | Jefferson Parish | St. Tammany Parish | | | |
|---|---|---|---|---|---|
| *I/M and RVP controls* | *RVP controls only* | *Neither I/M nor RVP controls* | | | |
| Ascension | Beauregard | Acadia | De Soto | Natchitoches | Tangipahoa |
| East Baton Rouge | Calcasieu | Allen | East Carroll | Ouachita | Tensas |
| Iberville | Grant | Assumption | East Feliciana | Plaquemines | Terrebonne |
| Livingston | Jefferson | Avoyelles | Evangeline | Rapides | Union |
| West Baton Rouge | Lafayette | Bienville | Franklin | Red River | Vermilion |
| | Lafourche | Bossier | Iberia | Richland | Vernon |
| | Orleans | Caddo | Jackson | Sabine | Washington |
| | Pointe Coupee | Caldwell | Jefferson Davis | St. Helena | Webster |
| | St. Bernard | Cameron | La Salle | St. John the Baptist | West Carroll |
| | St. Charles | Catahoula | Lincoln | St. Landry | West Feliciana |
| | St. James | Claiborne | Madison | St. Martin | Winn |
| | St. Mary | Concordia | Morehouse | St. Tammany | |

LDEQ specified fuel formulations and I/M properties by parish. For September 1-15, the Reid Vapor Pressure (RVP) of gasoline used was 7.8 psi in the 17 parishes represented by East Baton Rouge and Jefferson, with 9.0 psi in the remaining 47 parishes represented by St. Tammany in Table 5-2. For September 16 through Oct 31, LDEQ specified 11.5 psi RVP in all parishes. MOVES defaults were used for all other non-RVP gasoline parameters and for diesel fuel.

LDEQ specified using 2005 I/M programs in the 5-parish nonattainment area represented by East Baton Rouge in Table 5-2. The I/M program parameters shown below in MOBILE6-format were converted to MOVES-equivalent test standard identifications according to Table 3.10.4 of the technical guidance (EPA, 2010). Also per guidance (Appendix A-3 in EPA, 2010), the MOBILE6 vehicle classes were mapped to MOVES source types through the use of the MOVES I/M compliance factor percent.

```
* 2005 I/M and ATP for Baton Rouge Non-attainment Area

* I/M program On Board Diagnostics (exhaust)
*
I/M PROGRAM        : 1 2002 2050 1 TRC OBD I/M
I/M MODEL YEARS    : 1 1996 2050
I/M VEHICLES       : 1 22222 21111111 1
I/M STRINGENCY     : 1 20.0
I/M EFFECTIVENESS  : 0.75 0.75 0.75
I/M COMPLIANCE     : 1 96.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M GRACE PERIOD   : 1 2

*
* Baton Rouge I/M programs (evaporative)
*
I/M PROGRAM        : 2 2000 2001 1 TRC GC
I/M MODEL YEARS    : 2 1980 2001
```

```
I/M VEHICLES       : 2 22222 21111111 1
I/M COMPLIANCE     : 2 96.0
*
I/M PROGRAM        : 3 2002 2006 1 TRC GC
I/M MODEL YEARS    : 3 1980 2006
I/M VEHICLES       : 3 11111 21111111 1
I/M COMPLIANCE     : 3 96.0
*
I/M PROGRAM        : 4 2002 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS    : 4 1996 2050
I/M VEHICLES       : 4 22222 11111111 1
I/M STRINGENCY     : 4 20.0
I/M COMPLIANCE     : 4 96.0
I/M GRACE PERIOD   : 1 2
*
I/M PROGRAM        : 5 2007 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS    : 5 2007 2050
I/M VEHICLES       : 5 11111 21111111 1
I/M STRINGENCY     : 5 20.0
I/M COMPLIANCE     : 5 96.0
I/M GRACE PERIOD   : 1
```

The parish-level age distributions provided by LDEQ were averaged for each representative parish using a weighted average of vehicle populations in constituent parishes. In the data provided by LDEQ, just four of the 13 source types had unique age distributions by parish: motorcycle, passenger car, passenger truck, and light commercial truck. The other nine source types each had a single age distribution identical to the rest of the state.

Lastly, the input ratio of VMT to population is important in MOVES because it directly affects the magnitude of evaporative hydrocarbon emission factors from parked vehicles. LDOTD provided annual average day VMT by parish, which needed to be further broken out to vehicle type. The disaggregation was performed using Louisiana's temporal profiles (discussed later). Population provided by LDEQ covered only four source types of 13. For the nine source types not included in the LDEQ dataset, we used MOVES2010a default annual mileage accumulation rates (miles/vehicle/year) and the disaggregated VMT dataset (VMT/year) to estimate the population for the nine source types. LDEQ provided 2011 data for both VMT and Population, which was used directly for the 2010 base year without adjustment.

After preparing all MOVES inputs, ENVIRON's RUNSPEC generator tool was run to automatically create the input files to run MOVES for all conditions in the episode and domain. Once MOVES runs had completed, a post-processing tool was used to reformat the emission factors for input to CONCEPT MV.

#### 5.2.2.2 CONCEPT MV

The CONCEPT MV tool completely replaces EPS3 for the on-road mobile sector; the tool outputs air quality model-ready emissions files that are gridded, hourly, and speciated using the Carbon Bond version 6 (CB6) chemical mechanism. CONCEPT MV combines emission factors from MOVES2010a with VMT, vehicle population, and speed activity from transportation planning sources.

Louisiana on-road emissions were processed at the parish-level (as opposed to link level) with VMT input at the level of detail of parish and road type. Each episode day was processed one day at a time using hourly, gridded meteorological data (61 episode days).

Activity input to CONCEPT MV includes both VMT and vehicle population. CONCEPT MV gridded each activity type to the modeling domain using spatial surrogates according to road type or specific emissions type as shown in Table 5-3. The spatial surrogate assignments were based on EPA's cross-reference included in the SMOKE model.

**Table 5-3. Spatial surrogates used in CONCEPT MV processing.**

| Surrogate | Surrogate Code | Applicability in CONCEPT |
|---|---|---|
| Urban Population | 120 | Grids all VMT from road type U19 |
| Rural Population | 130 | Grids all VMT from road type R09 |
| Urban Primary Roads | 200 | Grids all VMT from road types U11, U12, U14, U16 |
| Rural Primary Roads | 210 | Grids all VMT from road types R01, R02, R06 |
| Urban Secondary Roads | 220 | Grids all VMT from road type U17 |
| Rural Secondary Roads | 230 | Grids all VMT from road types R07, R08 |
| Urban and Rural Primary Roads | 250 | Grids Combination Long-haul Truck population for calculation of extended idling emissions only. |
| 0.75 Total Roadway Miles + 0.25 Population | 255 | Grids all population for calculation of parked vehicle emissions (except from extended idling). |

CONCEPT MV estimates hourly VMT from an annual average day by applying a series of temporal profiles for month of year, day of week, and hour of day. The monthly temporal profiles were provided by LDEQ and are shown by road type in Figure 5-1. These monthly temporal profiles tend to show higher VMT in summer months.

Figure 5-2 shows the day of week temporal profiles from Louisiana's previous SIP modeling, which we used again in the current work. The day of week profiles show generally lower VMT on Saturday and Sunday (exception for urban local roads, U19) and the profiles feature a single weekday day type with no variation Monday through Friday.

The hourly temporal profile patterns differ according to weekday or weekend. Figure 5-3 shows each relative distribution of daily VMT to hours. The hourly profiles came from two sources. Weekday hourly profiles were prepared by LDEQ in the previous SIP. A weekend hourly profile was provided by LDOTD, applicable to all road types. The weekday profile has more pronounced VMT peaks during commuter periods in the morning and afternoon rush hours.

A fourth and final type of temporal profile CONCEPT uses are hourly fleet mix temporal profiles. The weekday fleet mix was derived from the previous Louisiana SIP, and the weekend fleet mix was a daily average of weekday and specified as the same mix at all hours.

All of the VMT was temporally allocated from average day total to hour specific by vehicle class and allocated to the grid. Population was directly allocated to the grid.

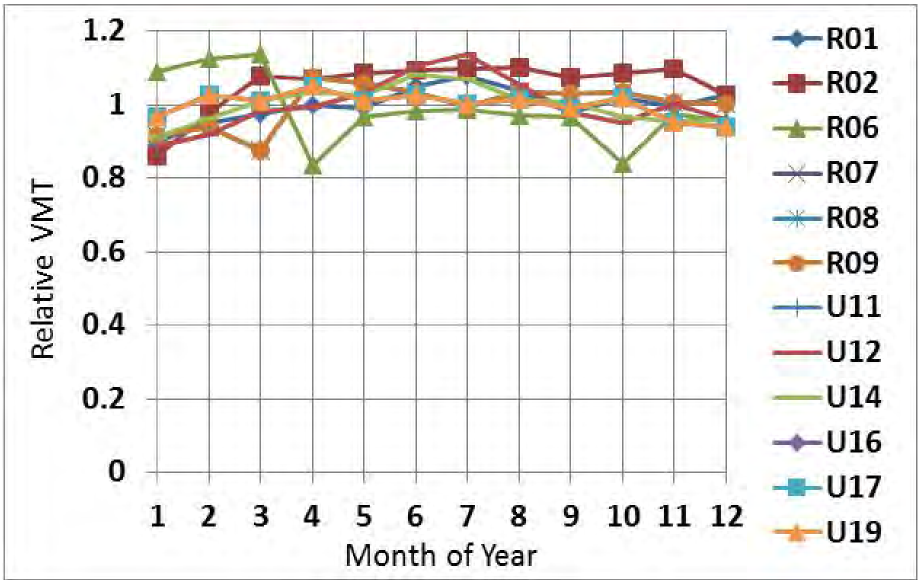



**Figure 5-1. Monthly temporal profiles by roadway type.**

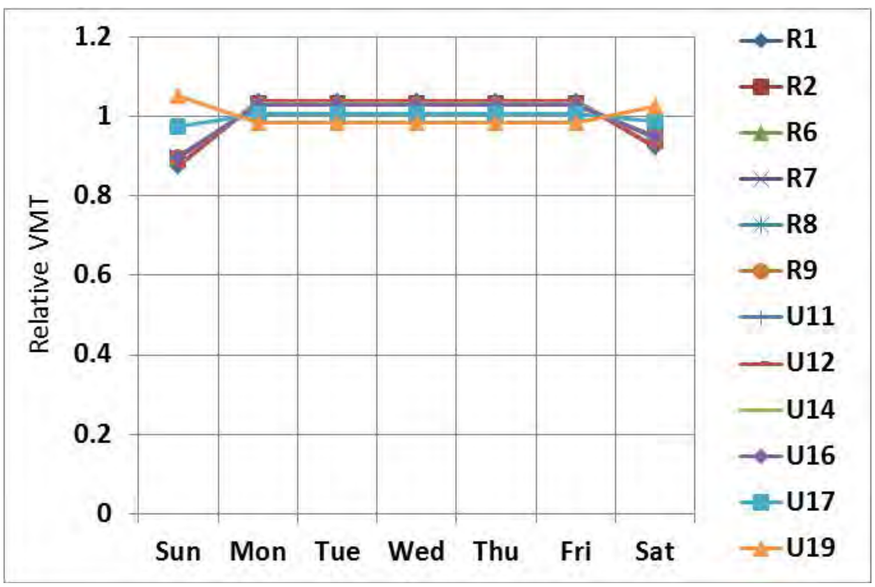



**Figure 5-2. Day of week temporal profiles by roadway type.**

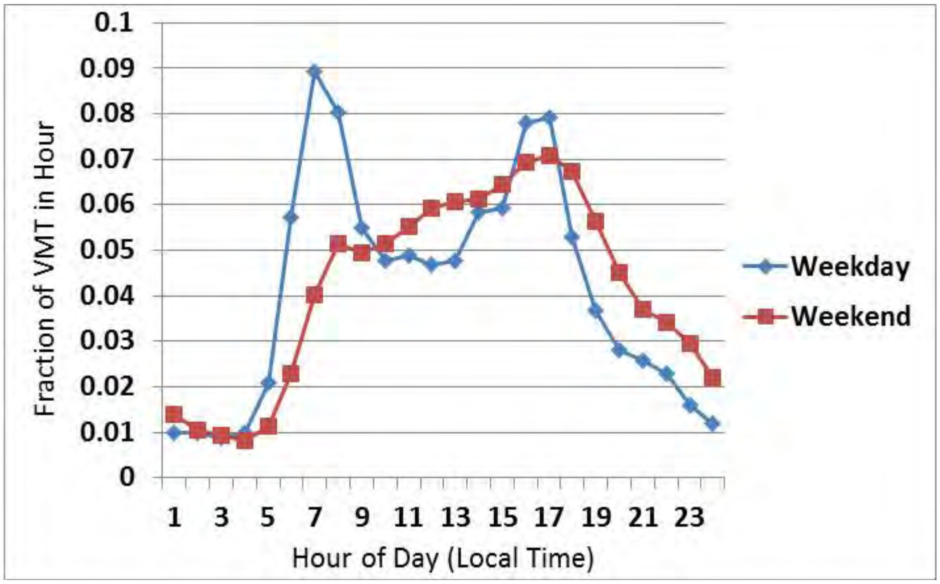



**Figure 5-3. Hourly temporal profiles for all roadways on weekdays and weekends.**

Daily average vehicle speeds by road type were provided by the DOTD. Provided speeds shown in Table 5-4 were 90% of the design speed for their conformity plan.

**Table 5-4. Louisiana average vehicle speeds.**

| Road Type | Average Speed (mph) |
|---|---|
| Rural Interstate | 63.0 |
| Rural Principal Arterial | 58.5 |
| Rural Minor Arterial | 49.5 |
| Rural Major Collector | 45.0 |
| Rural Minor Collector | 36.0 |
| Rural Local | 27.0 |
| Urban Interstate | 58.5 |
| Urban Other Expressway | 58.5 |
| Urban Principal Arterial | 49.5 |
| Urban Minor Arterial | 45.0 |
| Urban Collector | 36.0 |
| Urban Local | 27.0 |

In summary, CONCEPT MV temporally allocated average day VMT to hourly by vehicle type using temporal profiles. The model then gridded the VMT using spatial surrogates according to roadway type and vehicle population using a combination of spatial surrogate. CONCEPT MV looked up the MOVES emission factors closest to the road type speed and grid cell temperature and humidity and interpolated the emission factor. After this interpolation, CONCEPT MV multiplied emission factors in grams/mile with the hourly gridded VMT and emission factors in grams/vehicle/hour with the gridded vehicle populations to calculate the full inventory. Figures 5-4 and 5-5 show a snapshot of the modeling episode at 8-9 AM on September 1, 2010. Figure 5-4 shows the species nitrous oxide (NO) and Figure 5-5 shows alkane (“PAR”) emissions in units of moles/hour.

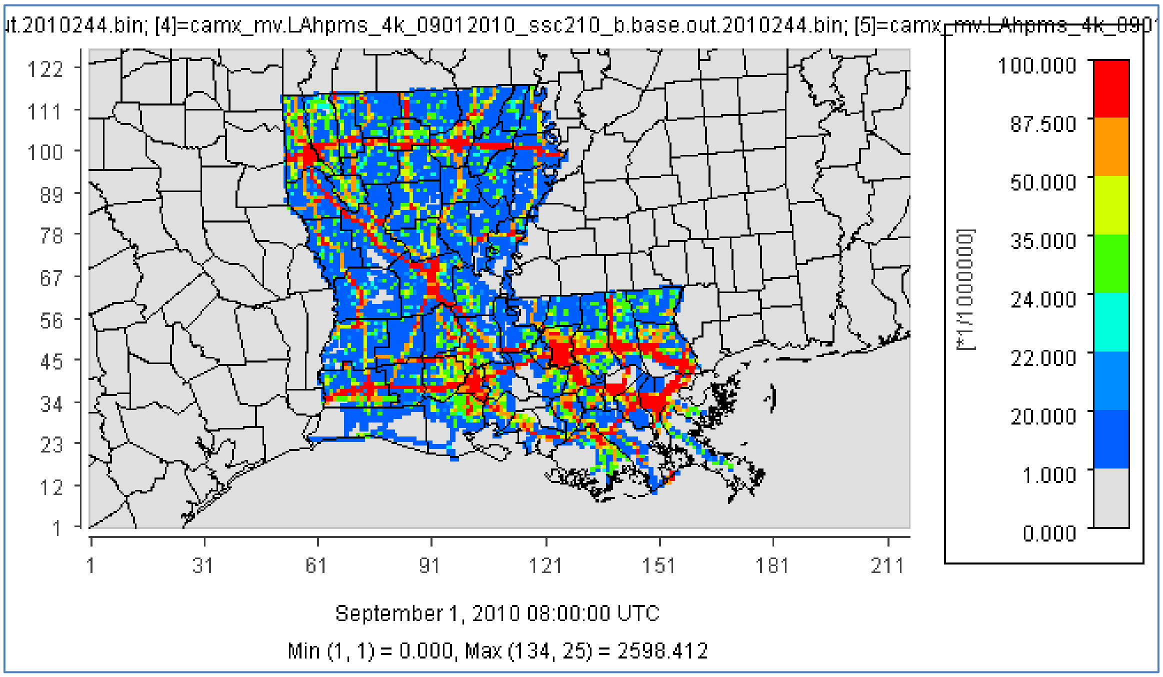



**Figure 5-4. Louisiana on-road NO emissions (mol/h) during 8-9 AM LST September 1, 2010.**

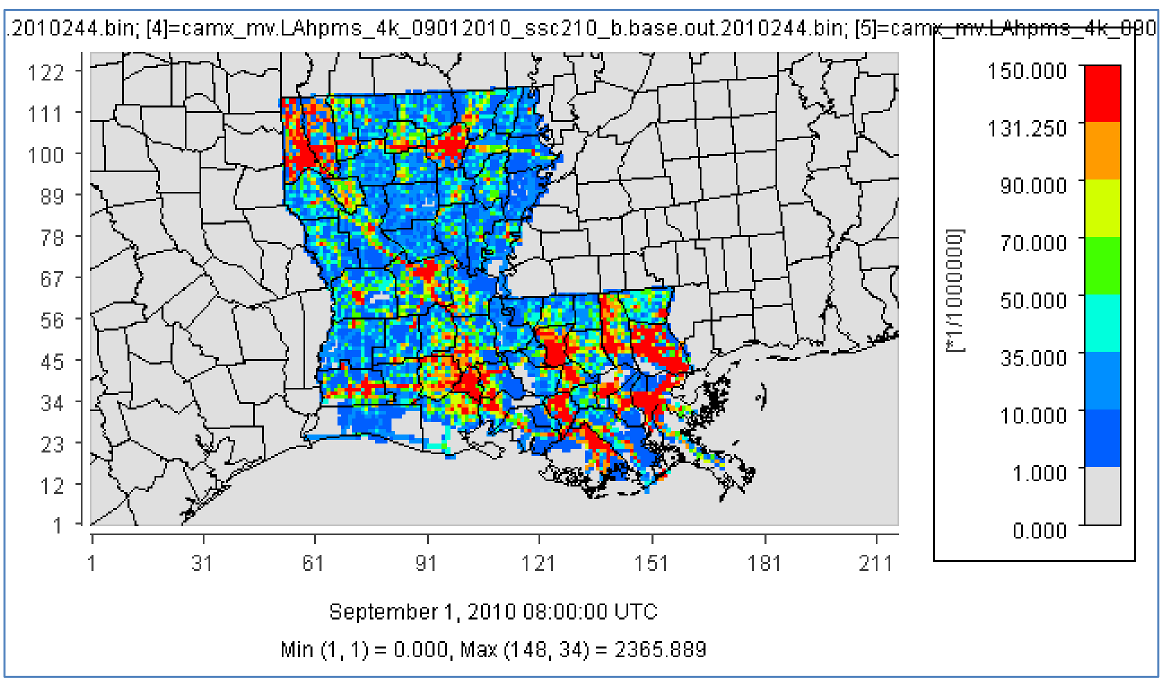



**Figure 5-5. Louisiana on-road alkane (PAR) emissions (mol/h) during 8-9 AM LST September 1, 2010.**

### 5.2.3 Off-Road Sources

The EPA's NMIM was used to generate Louisiana statewide parish-level off-road equipment emissions estimates for September and October 2010. NMIM is a tool for estimating on-road and non-road emissions by county for the entire US to support updates to the EPA National Emissions Inventory (NEI). For this modeling effort NMIM version NMIM20090504 was run with county database NCD20090531 and NONROAD2008a. Emissions were estimated from off-road equipment in the following categories:

- Agricultural equipment, such as tractors, combines, and balers;
- Airport ground support, such as terminal tractors and supply vehicles;
- Construction equipment, such as graders and back hoes;
- Industrial and commercial equipment, such as fork lifts and sweepers;
- Residential and commercial lawn and garden equipment, such as leaf blowers;
- Logging equipment, such as shredders and large chain saws;
- Recreational equipment, such as off-road motorbikes and ATVs; and
- Recreational marine vessels, such as power boats.

Local data were used for gasoline fuel parameters with guidance from LDEQ and to be consistent with the on-road mobile inventory. All non-gasoline equipment used default parameters. Gasoline sources used non-default gasoline fuel RVP values. For September 1 through September 15, inclusive, the set of parishes listed in Table 5-5 had an RVP of 7.8 psi. Outside these parishes gasoline was assigned an RVP of 9 psi. After September 15 all parishes used 11.5 psi RVP gasoline.

**Table 5-5. Parishes assigned 7.8 RVP for episode days September 1- 15, 2010.**

| Parish | |
|---|---|
| Ascension | Livingston |
| Beauregard | Orleans |
| Calcasieu | Pointe Coupee |
| East Baton Rouge | St. Bernard |
| Grant | St. Charles |
| Iberville | St. James |
| Jefferson | St. Mary |
| Lafayette | West Baton Rouge |
| Lafourche | |

In order to support the different gas RVP values NMIM was run with:

1. Non-gasoline equipment run for September and October (default fuel parameters)
2. Gasoline-only equipment run for September and October with 11.5 psi, all parishes
3. Gasoline-only equipment run for September with 7.8 psi to represent Table 5 parishes

4. Gasoline-only equipment run for September with 9 psi, to represent parishes outside the Table 5-5 list.

Run types 3 and 4 representing September 1-15 were averaged with run 2 representing September 16-31 to determine average September day emissions.

For quality assurance, the Louisiana (compiled) inventory was compared with a simple state-wide Louisiana NMIM/NONROAD run for September and October. The expectation was that non-gasoline emissions would match exactly for both September and October. Gasoline emissions would be similar between runs, with differences in magnitude attributable to RVP. Differences were primarily in evaporative total organic gasses (TOG).

Using EPS3, the off-road emissions were speciated to CB6 compounds, temporally allocated to day of week and hour of day, and spatially allocated using EPA default source category cross-reference files.

NONROAD and NMIM do not include emission estimates for railroad locomotives, aircraft, and marine vessels (excluding maintenance equipment). Louisiana emissions for locomotives and aircraft were extracted from the EPA 2008 NEI (version 2) and processed as area sources. The development of emissions from commercial marine vessels is described next.

#### 5.2.4 Commercial Marine Vessels: Shipping Channels and Ports

Emissions from commercial marine vessels servicing the ports along the Mississippi River and the Port of Lake Charles were processed separately from other area sources.

ENVIRON (2010) updated the commercial marine shipping emissions inventory for the State of Louisiana for the year 2006. This emissions inventory was further modified for the 2010 Base Year. The inventory is based on the latest estimates from the EPA for “Category 3” ocean-going vessels. The EPA estimates are provided by port and by transit mode in a spatially precise and accurate link-based format that is suitable for emissions processing. These data were reformatted for input to the EPS3 PRESHP module. PRESHP is a link-based module specifically designed to handle shipping lane emissions. Five Louisiana ports were processed:

- Baton Rouge
- Lake Charles
- New Orleans
- Port of Plaquemines
- Port of South Louisiana

These data include the following transit modes:

- Hoteling (at port, auxiliary engines only, no propulsion engines used)
- Maneuvering (at or near port)

- Reduced Speed Zone (RSZ; navigating away from a port towards the open ocean, often through a river system)
- Cruise Mode (CM; the vessel is away from constrained waterways and traveling at cruise speed)

The hoteling and maneuvering emissions were modeled as points located at the port center. The RSZ emissions were modeled as line emission sources, which are defined as multiple straight line segments with known endpoint coordinates. The CM emissions were not used for the current project to avoid double counting emissions with the existing ocean traffic emissions inventory developed from the BOEM database (see Gulf Sources below).

EPA shipping emissions were estimated as total annual emissions for 2002. Previous LDEQ emissions were prepared for 2006 (ENVIRON, 2010). To obtain 2010 emissions, the 2006 emissions were scaled based on growth and control factors. Growth factors were based on the annual total commodity tonnage summary from the US Army Corp of Engineers (USACE) Waterborne Commerce Statistics, principal ports database (http://www.ndc.iwr.usace.army.mil/data/datappor.htm). Table 5-6 provides a summary of commodities processed using the total tonnage for the 5 Louisiana ports. The growth factor from 2006 to 2010 was estimated as 1.0035.

**Table 5-6. Principal Ports Commodity Tonnage by year.**

| Year | Louisiana Combined Principal Ports Commodity Tonnage | Growth Factor |
|---|---|---|
| 2002 | 468,612,466 | 1.0000 |
| 2003 | 453,217,009 | 0.9671 |
| 2004 | 468,528,396 | 0.9998 |
| 2005 | 438,011,524 | 0.9347 |
| 2006 | 473,034,017 | 1.0094 |
| 2007 | 482,759,763 | 1.0302 |
| 2008 | 466,330,458 | 0.9951 |
| 2009 | 435,745,874 | 0.9299 |
| 2010 | 474,661,368 | 1.0129 |
| 2010/2006 | - | 1.0035 |

EPA estimated NOx control factors for the year 2020 for different engine/ship types. These values were interpolated from 2006 values to estimate a 2010 control factor for NOx as 0.9781.

The growth and control factors were applied to adjust the 2006 emissions to estimated 2010 emissions. The emissions were projected to the 4 km modeling grid shown in Figure 4-1. Ocean going vessels typically emit from stacks that are between 40–60 m in height. This corresponds to the second vertical layer in the CAMx model, which spans from 32 m to 81 m. For this application plume heights for all transit modes were set to 56 m, ensuring that emissions were injected into the second model layer. No temporal variation was assigned, i.e.

the emissions were assumed to be constant in time. Figure 5-6 is an example of the spatial distribution of 24 hr average NOx emissions.

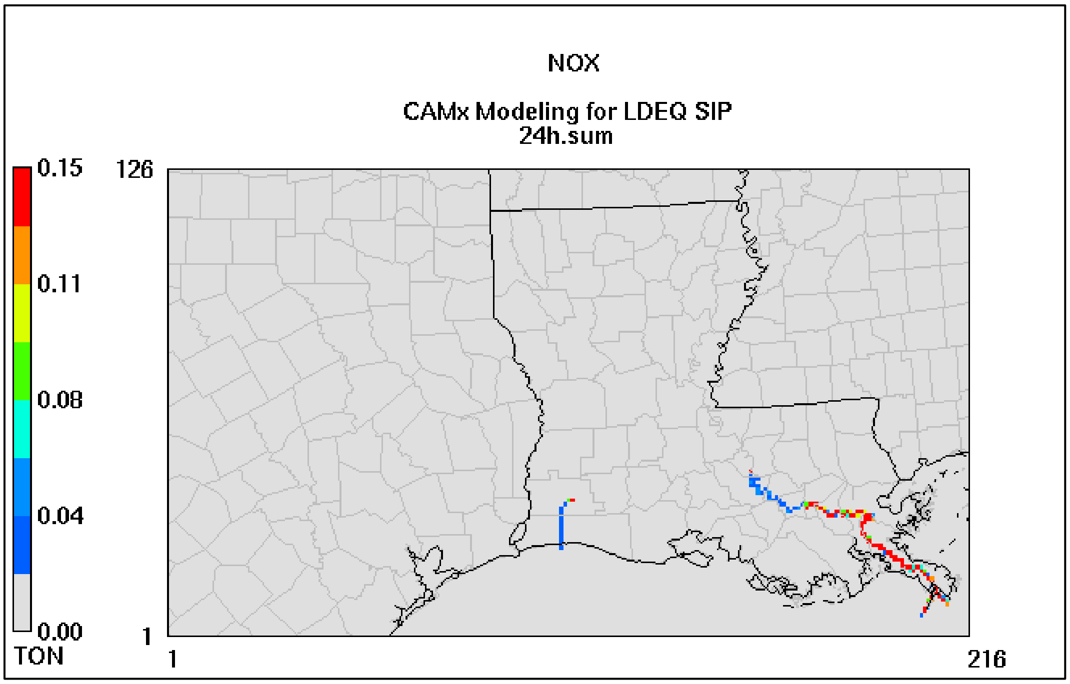



**Figure 5-6. 24-hour commercial marine shipping NOx emissions at Louisiana deep draft ports and along RSV shipping lanes.**

### 5.2.5 Port Fourchon

According to LDEQ, emission estimates may have been historically underestimated for Port Fourchon, which is a harbor located on the Gulf coast in southeastern Louisiana that specifically supports offshore oil and gas development activities. Emission estimates were updated based on a report by Starcrest Consulting Group, LLC and Louisiana State University (2010). Figure 5-7 is an image of the emissions summary (Table 2.1) from that report. The off-shore source estimates from this table were not included as they are already represented in the Gulf platform and non-platform inventories from the BOEM data (discussed below).

The Port Fourchon emission estimates were spatially allocated to two grid cells that the port spans. The coordinates of the port were acquired from Wikipedia and plotted in GIS overlaying a street map and imagery layer with the 4 km grid. Based on a visual inspection of the plot (Figure 5-8) the Port Fourchon emission estimates were distributed equally between two grid cells.

| Table 2.1: Summary of Estimated Emissions | | | |
|---|---|---|---|
| Source Category | $NO_x$ | VOC | CO |
| Marine Vessels | **10.0** | 0.36 | 1.15 |
| Cargo Handling Equipment | **0.30** | 0.03 | 0.07 |
| Heavy-Duty Vehicles | **0.14** | 0.01 | 0.03 |
| Aircraft | **0.22** | | 0.63 |
| Off-Shore Non-Platform Sources | **12.1** | 2.3 | 2.8 |
| Off-Shore Platform Sources | **7.6** | 4.3 | 9.1 |
| **Total** | **30.4** | **7.0** | **13.8** |

**Figure 5-7. Table 2.1 from the Port Fourchon Ozone Day Port-Related Emissions Inventory Study (Starcrest and LSU, 2010).**

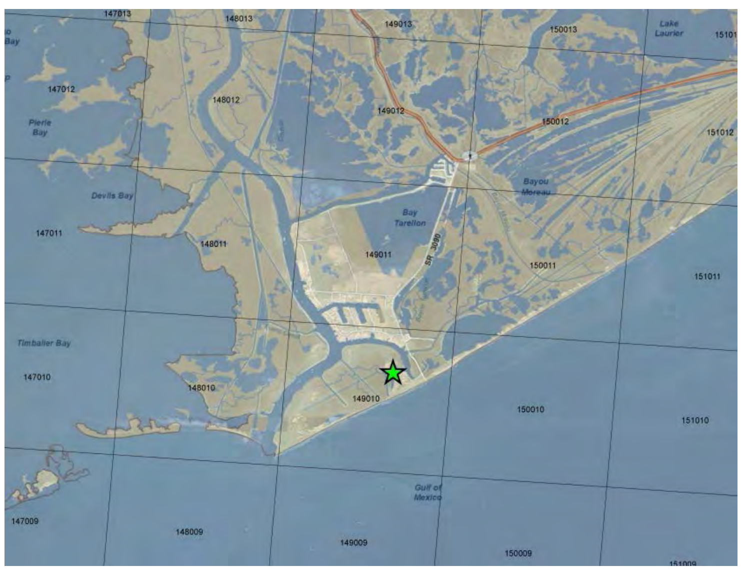


**Figure 5-8. Port Fourchon with 4 km grid overlay.**

### 5.2.6 Haynesville Shale

The Haynesville Shale is a rock formation that lies at depths of 10,000 to 13,000 feet below the surface and straddles the border between Northeast Texas and Northwest Louisiana near Shreveport. This formation is estimated to contain very large recoverable reserves of natural gas, and during the first two years since the drilling of the first highly productive wells in 2007-2008, it was the focus of aggressive exploration and leasing activity.

In 2009, Northeast Texas Air Care (NETAC; www.netac.org), a local stakeholder group comprised of representatives of local government, business and industry, the general public, and environmental interest groups, undertook a study to investigate how development in the Haynesville Shale may impact future ozone air quality in Northeast Texas. Well production data, the historical record of activity in the nearby Barnett Shale, and other available literature were used to project future activity in the Haynesville Shale. Annual natural gas production for the years 2009-2020 was estimated for three scenarios corresponding to aggressive, moderate, and limited development of the Haynesville Shale (Grant et al., 2009).

The 2009 study generated model-ready emission inventories of Haynesville Shale sources for the year 2012. These emissions data included low, moderate, and high scenarios for each of three general sources categories (exploration, production, and "midstream" processing), resulting in a total of nine separate inventories. Specific 2012 model-ready inventories for the exploration category (drill rigs and other non-road sources) and the production category (wells) were incorporated into the 2010 Louisiana emissions inventory. Based on a review of the actual 2010 reported well counts, the limited development (low) scenario for 2012 production sources most accurately reflected 2010, while the number of drill rigs in 2010 was comparable to the aggressive (high) scenario for 2012 exploration sources. The midstream sources (e.g., permitted compressor stations and gas processing plants) were assumed to be included in the Louisiana 2010 point source permitting inventory and no adjustment was made to reflect any different emissions in 2010 from these specific Haynesville sources.

Spatial allocation of the Haynesville Shale emissions was based on Louisiana Department of Natural Resources, Haynesville Shale wells data in GIS shape files. These were obtained from http://sonris-www.dnr.state.la.us/gis/agsweb/arcgisserver/arcgisoutput/extData/shp/Haynesville_wells.zip. Active well location data for 2010 were used as weight factors in developing the spatial surrogates.

## 5.3 Gulf Sources

There are a number of emission sources located in the Gulf of Mexico (GoM). Emissions from the GoM were obtained from the Year 2008 Gulfwide Emission Inventory Study (BOEM, 2010). Emissions were obtained for both platform sources and non-platform sources.

The platform source emissions included a wide number of emission sources, including: amine units, boilers/heaters/burners, diesel and gasoline engines, drilling rigs, combustion flares, fugitives, glycol dehydrators, flashing losses, mud degassing, natural gas engines and turbines, pneumatic pumps, pressure/level controllers, storage tanks, and cold vents.

The non-platform sources consisted of oil and gas production-related and non-production related sources. The production-related sources included drilling rigs, pipelaying operations, support helicopters, support vessels, and survey vessels. The non-production-related sources included: biogenic and geogenic emissions, commercial fishing vessels, commercial marine vessels, the Louisiana Offshore Oil Port (LOOP), military vessels, and vessel lightering.

The 2008 platform source emissions were projected to 2010 using lease-specific projection factors based upon 2008 and 2010 total oil and gas production quantities converted to a BTU-basis (BOEM, 2012). If lease-specific production quantities were unavailable for either 2008 or 2010, then a GoM average projection factor of 0.901, based upon GoM-wide production, was used to project 2008 emissions to 2010.

The 2008 non-platform source emissions associated with production were projected to 2010 using a GoM average projection factor of 0.901 based upon GoM-wide production quantities for 2008 and 2010. It was assumed that the 2008 non-platform source emissions not associated with production were representative of 2010, so the 2008 emissions were carried forward to 2010 without any projection.

## 5.4 Anthropogenic Emissions Outside of Louisiana

Anthropogenic emission estimates for states outside of Louisiana, as well as for Canada, Mexico, and commercial marine shipping outside the Gulf of Mexico, were developed by Alpine Geophysics. Alpine developed a 2008 inventory on the Regional Planning Organization (RPO) continental US (CONUS) domain for several concurrent regional modeling programs, and provided these data for use in this project. The inventory was based on the most complete and consistent inventory available at the time modeling commenced; namely, version 2 of the 2008 National Emission Inventory (2008 NEIv2, publicly released on the NEI website on April 10, 2012). A draft Technical Support Document (TSD) for the 2008 NEIv2 has been developed by EPA and is available at http://www.epa.gov/ttn/chief/net/2008neiv2/2008_neiv2_tsd_draft.pdf.

The EPA maintains and updates the NEI every three years, which consists of a comprehensive and detailed estimate of air emissions of both criteria and hazardous air pollutants from all air emissions sources in the US by county as well as for Canada and Mexico. The NEI is based primarily upon emission estimates and emission model inputs provided by State, Local, and Tribal air agencies for sources in their jurisdictions, and supplemented by data developed by the EPA. The 2008 NEIv2 contained the most recent updates to the point, nonpoint (other area), non-road, and on-road motor vehicle emissions categories. All source categories except county-level on-road and commercial marine shipping outside the Gulf of Mexico were processed.

On-Road Mobile sources were separately developed using the MOVES2010a model in “inventory mode”, run for each US county outside of Louisiana, using a representative weekday/weekend day activity per month. Marine shipping emissions outside of the Gulf of Mexico were developed for 2008 using an inventory derived from the EPA 2005v4.1 modeling platform (ftp.epa.gov/EmisInventory/2005v4.1, April 2011).

The 2008 inventories were processed by Alpine using the EPA Sparse Matrix Operator Kernel Emissions (SMOKE, v3.1) processor using the ancillary data for spatial, temporal, and speciation distribution supplied with the emissions input files. SMOKE was used to generate gridded, speciated, temporally allocated emissions for the 36, 12, and 4 km modeling domains. The 2008 data were used for the 2010 base year modeling without year-to-year adjustment.

## 5.5 Biogenic Emissions

Biogenic sources are important contributors to air emissions in North America and must be combined with anthropogenic emissions for photochemical model simulations. The Model of Emissions of Gases and Aerosols from Nature (MEGAN) version 2.10 (ENVIRON, 2012) was initially used to develop the biogenic emissions inventory. Subsequently, BEIS was run by Alpine Geophysics as an alternative source of biogenic emissions, which was successful in reducing over predicted isoprene emissions that were shown in CAMx simulations to contribute to ozone over predictions throughout the domain. The biogenic emissions from MEGAN and BEIS are gridded, hourly files formatted for input to the CAMx model using the CB6 chemical mechanism.

### 5.5.1 MEGAN Processing

MEGAN estimates net emissions of gases and aerosols from terrestrial ecosystems to the atmosphere (Sakulyanontvittaya, 2008; Guenther et al., 2006). Emission calculations are driven by land cover, weather, and atmospheric chemical composition. MEGAN has global land cover data with a base resolution of approximately 1 $km^2$. The latest version of MEGAN includes an explicit canopy environment, updated emission algorithms, and a soil NOx emission model that accounts for fertilizer application and precipitation. Land cover and emission factor inputs were updated with: 1) Leaf Area Index (LAI) based on improved 2008 satellite data products with 8-day temporal resolution, 2) improved Plant Functional Type fractional (PFTf) coverage data based on 30-meter 2008 LANDSAT TM data; and 3) emission factors based on recent emission measurements and improved U.S. species composition data.

The LAI dataset provided with MEGAN contains a set of 46 eight-day 1-km spatial resolution LAIv files for North America which were developed from 2008 NASA MODIS LAI product version 5 (ENVIRON, 2012). The dataset has been reviewed using ARCGIS and eco-region average, minimum, and maximum values were examined for quality assurance. The default LAI data in ESRI 1-km GRID format were interpolated using a zonal average method and reformatted to text format for the modeling grid.

The PFTf dataset provided with MEGAN contains a set of 9 PFTf data files with 56-m or 1-km resolution for the contiguous US, which were developed from 2008 National Land Cover Dataset (NLCD) with 30-meter resolution and 2008 Cropland Data Layer (CLD) with 56-meter resolution (ENVIRON, 2012). MEGAN includes a total of 17 PFTs but 8 types (e.g., tropical and boreal PFTs) do not occur within the CAMx modeling domain. The 9 PFTf files that do occur are for needle leaf evergreen tree, needle leaf deciduous tree, broadleaf evergreen tree, broadleaf deciduous tree, broadleaf deciduous shrub, cold grass, warm grass, other crops, and corn categories. Each file was reviewed in ARCGIS and ecoregion average and minimum and maximum values were examined for quality assurance. The dataset was processed in the same manner as LAI.

MEGAN calculates emissions for 20 categories of biogenic compounds. Some are individual compounds while others represent groups of compounds that are then allocated to individual compounds using built-in speciation profiles. Geo-gridded emission factor maps were calculated based on plant species composition and plant species specific emission factors for 10 biogenic compounds; isoprene, methyl butenol, nitric oxide (NO), and 7 monoterpenes. PFT-average emission factors are combined with the geo-gridded PFTs for an additional 10 categories. The emission factor map data was processed using a zonal average method and reformatted from ESRI GRID format to text format for the modeling domain.

MEGAN requires meteorological data near the surface, such as temperature, solar radiation, and wind speed to drive emission algorithms. For this project, we processed the WRF data using MCIP version 4 for August - November, 2010. This provides all parameters needed for the emission estimates.

Photosynthetically Active Radiation (PAR) is an important driving variable for MEGAN. MEGAN provides two options for PAR input data; solar radiation from a meteorological model (in MCIP output format) or PAR data from satellite observation. MCIP data are usually available and have no problems with missing data, but are subject to uncertainties in simulated cloud cover (a parameter for which PAR is very sensitive). MEGAN internally estimates PAR from MCIP solar radiation data by assuming 45% of the solar radiation is in the 400-700 nm spectral region. Usually satellite data provide a better approximation of PAR but are subject to missing data periods. The development of 2010 biogenic emission for this project used the predicted solar radiation from WRF/MCIP because satellite PAR data were not available for this period.

MEGAN estimates emissions for 150 chemical species, which were converted into CB6 model compounds for CAMx modeling. Biogenic emissions were processed for each hour of each day on all three of the 36/12/4 km modeling grids. The time zone of the data was set to CST. The inventories were visually checked for quality assurance.

### 5.5.2 BEIS Processing

Alternative biogenic emissions were processed using BEIS3.14 contained in the SMOKE3.1 emissions processing system (http://www.cmascenter.org/). Reference emission files for BEIS3.14 rely on the BELD3 (Biogenic Emissions Landuse Database, version 3) available at http://www.epa.gov/ttn/chief/emch/biogenic/. This North American database contains fractional area information on 230 individual forest, grass, and crop types at 1-km horizontal resolution. Tools for spatial allocation of BELD3 data into common user defined grids are also available at this website. As part of the reference emission preprocessing, BEIS3.14 contains season-specific and vegetation-specific information for emissions of 33 individual VOC species (including isoprene and 14 monoterpenes), biogenic/agricultural NO, and LAI (Leaf Area Index) information needed in the canopy light dependence calculations of isoprene, methanol and methyl-butenol.

The BELD3 files were used to develop the required input data for the 36, 12 and 4 kilometer grids. The project specific gridded hourly meteorological data generated by WRF for 2010 were used to produce hourly, temperature adjusted biogenic emissions.

## 5.6 Wildland, Agricultural, and Prescribed Fires

Fire emissions were based on the FINN version 1 dataset, which were downloaded from http://bai.acd.ucar.edu/Data/fire/. The global dataset contained daily emissions for each satellite pixel, which represented an area of approximately 1 $km^2$. Emission species included NO, $NO_2$, $PM_{2.5}$, CO, and non-methane organic compounds (NMOC) speciated into MOZART-4 species for six fire types – tropical, temperate, and boreal forests, cropland, shrublands, and grasslands. The data were windowed to the 36/12/4 km modeling grids and mapped to CAMx CB6 speciation. Fire points within 5 km of one another were assumed to be part of the same fire and assigned properties of a larger fire.

The daily fire emissions were then processed from August to October, 2010 using an updated version of EPS3 (version 3.20). EPS3 incorporated the WRAP methodology to temporally and vertically (by altitude) allocate the fire emissions. Temporally, the same diurnal profile was applied to all fires such that emissions were highest in the early afternoon and lowest at night. Vertically, a fraction of each hour's emissions was assigned to the lowest layer; the rest was distributed into multiple point sources directly above with one point assigned to each CAMx layer between the plume bottom and plume top, weighted by the thickness of each layer. The fraction in layer 1 and the plume bottom and top were all dependent on the hour of the day and size of the fire. All emissions were output into a point source file and flagged with no additional plume rise.

Figure 5-9 shows monthly total NOx emissions for September and October, 2010. Near Louisiana, fire emissions were highest in eastern Arkansas, especially in September and October due to crop burning.

## 5.7 Summary of 2010 Louisiana Emissions

Parish level emissions for 2010 are reported in Table 5-6. As biogenic and fire emissions are not reported at the county level they are not included in this comparison. Figures 5-10 through 5-12 show examples of the spatial distribution of total model-ready 2010 weekday low-level (gridded – not including point sources) emission of NOx, CO, and VOC over the 4 km modeling domain.

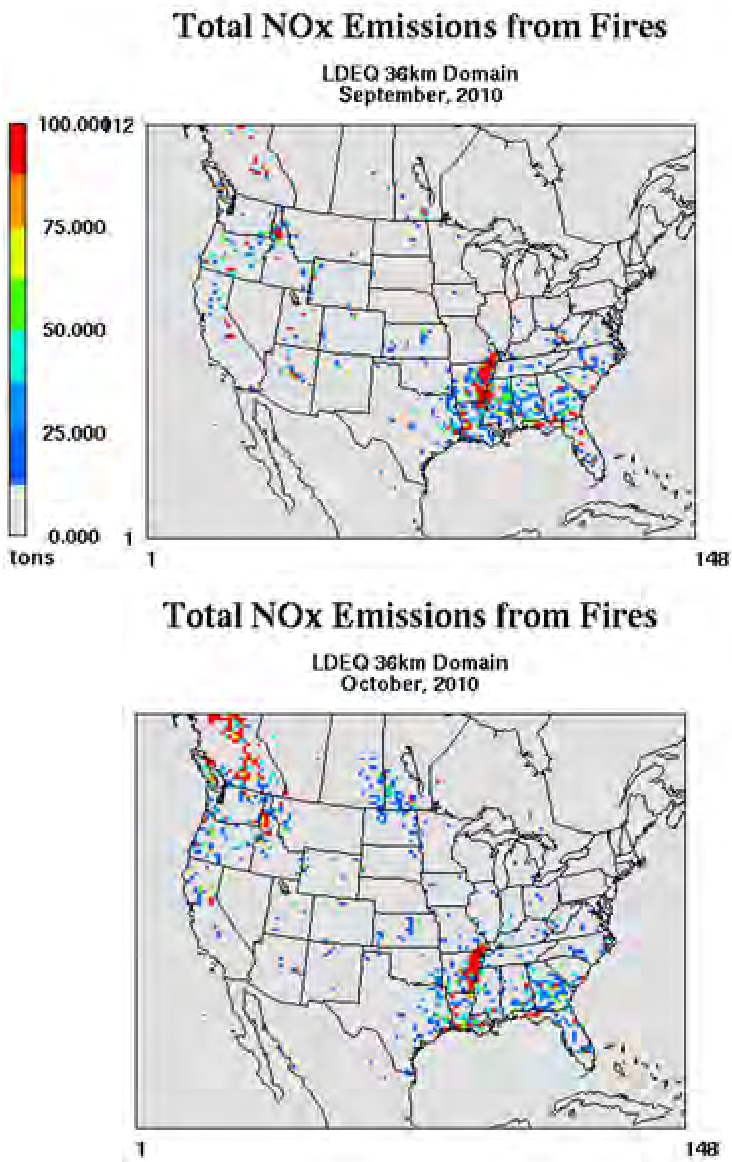



**Figure 5-9. FINN-based fire NOx emissions for September and October 2010.**

Table 5-7. Summary of 2010 Louisiana emissions (tons/day) for typical September weekday.

| Parish | NOx Area | NOx Off-road | NOx On-road | NOx Points | CO Area | CO Off-road | CO On-road | CO Points | VOC Area | TOG Off-road | TOG On-road | VOC Points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acadia | 1.08 | 1.56 | 5.35 | 8.08 | 2.12 | 6.28 | 35.04 | 3.16 | 4.26 | 0.96 | 4.51 | 1.33 |
| Allen | 0.31 | 0.83 | 2.16 | 1.65 | 1.33 | 1.77 | 13.04 | 2.95 | 1.70 | 0.18 | 1.68 | 0.19 |
| Ascension | 3.01 | 1.63 | 5.48 | 20.01 | 15.75 | 9.99 | 36.98 | 10.75 | 22.05 | 0.83 | 4.74 | 8.44 |
| Assumption | 0.87 | 0.44 | 2.85 | 3.33 | 13.32 | 2.12 | 25.98 | 2.52 | 2.15 | 0.31 | 5.42 | 1.42 |
| Avoyelles | 0.82 | 1.47 | 2.96 | 0.38 | 8.95 | 4.75 | 19.21 | 0.17 | 3.30 | 0.60 | 2.69 | 0.07 |
| Beauregard | 0.51 | 1.49 | 3.42 | 7.51 | 1.42 | 6.31 | 21.55 | 6.50 | 2.40 | 1.41 | 2.56 | 2.88 |
| Bienville | 2.52 | 0.66 | 3.11 | 5.58 | 2.40 | 1.97 | 16.11 | 2.92 | 1.75 | 0.26 | 1.54 | 1.51 |
| Bossier | 4.25 | 2.90 | 7.94 | 1.87 | 10.42 | 12.99 | 56.67 | 1.38 | 4.07 | 1.68 | 7.36 | 1.41 |
| Caddo | 11.68 | 6.69 | 15.03 | 4.06 | 10.43 | 53.59 | 105.24 | 2.39 | 14.91 | 4.86 | 13.23 | 3.19 |
| Calcasieu | 4.67 | 5.14 | 11.11 | 56.06 | 10.86 | 31.62 | 78.18 | 39.58 | 31.45 | 5.56 | 8.27 | 19.07 |
| Caldwell | 0.07 | 0.72 | 1.58 | 0.15 | 0.44 | 1.44 | 9.54 | 0.01 | 0.93 | 0.20 | 1.33 | 0.01 |
| Cameron | 0.31 | 0.56 | 1.01 | 4.01 | 1.77 | 8.00 | 6.01 | 2.03 | 1.25 | 2.97 | 0.73 | 2.13 |
| Catahoula | 0.22 | 0.85 | 1.51 | 0.00 | 2.29 | 2.71 | 8.46 | 0.00 | 1.03 | 0.42 | 1.00 | 0.00 |
| Claiborne | 0.25 | 0.32 | 2.23 | 0.70 | 0.76 | 3.20 | 11.97 | 1.01 | 1.68 | 0.76 | 1.49 | 0.22 |
| Concordia | 0.08 | 1.04 | 1.99 | 0.00 | 0.39 | 4.62 | 11.92 | 0.00 | 1.66 | 1.08 | 1.41 | 0.00 |
| De Soto | 24.65 | 1.25 | 4.87 | 19.24 | 16.67 | 4.94 | 26.35 | 8.58 | 7.88 | 0.95 | 2.43 | 7.44 |
| E Baton Rouge | 5.73 | 5.42 | 15.95 | 30.25 | 5.34 | 51.87 | 112.75 | 30.82 | 32.99 | 4.13 | 15.38 | 17.85 |
| East Carroll | 0.18 | 1.20 | 1.28 | 0.33 | 2.22 | 1.89 | 6.73 | 0.08 | 0.62 | 0.30 | 0.61 | 0.04 |
| East Feliciana | 0.15 | 0.31 | 1.53 | 0.79 | 0.60 | 2.42 | 9.14 | 0.25 | 0.91 | 0.64 | 1.28 | 1.31 |
| Evangeline | 0.54 | 0.88 | 2.76 | 2.81 | 3.41 | 4.03 | 16.63 | 9.32 | 5.81 | 0.87 | 2.12 | 0.52 |
| Franklin | 0.20 | 1.03 | 1.46 | 0.28 | 0.60 | 2.84 | 9.95 | 0.15 | 1.24 | 0.32 | 1.51 | 0.04 |
| Grant | 0.26 | 0.93 | 2.42 | 0.54 | 1.04 | 3.07 | 13.14 | 2.43 | 1.22 | 0.79 | 1.42 | 0.39 |
| Iberia | 2.63 | 1.82 | 2.19 | 4.63 | 21.39 | 12.16 | 15.57 | 4.49 | 6.34 | 1.30 | 1.92 | 1.96 |
| Iberville | 2.30 | 1.38 | 2.08 | 21.80 | 17.82 | 4.22 | 11.92 | 14.65 | 18.10 | 0.55 | 1.41 | 6.53 |
| Jackson | 0.65 | 0.26 | 1.68 | 4.81 | 1.08 | 1.92 | 9.64 | 4.66 | 1.16 | 0.24 | 1.27 | 2.04 |
| Jefferson | 7.51 | 8.25 | 12.53 | 37.62 | 6.19 | 67.48 | 104.01 | 4.14 | 27.99 | 7.20 | 15.47 | 1.93 |
| Jeff Davis | 0.38 | 1.70 | 3.72 | 2.48 | 3.63 | 5.51 | 21.46 | 0.62 | 4.30 | 0.89 | 2.13 | 0.24 |
| Lafayette | 3.23 | 3.84 | 9.70 | 5.85 | 7.79 | 36.66 | 72.92 | 0.48 | 9.70 | 4.39 | 8.52 | 0.35 |
| Lafourche | 12.65 | 1.52 | 4.70 | 5.22 | 15.01 | 11.09 | 34.99 | 4.47 | 8.79 | 2.03 | 4.02 | 2.40 |
| La Salle | 0.21 | 0.47 | 1.91 | 0.42 | 0.42 | 2.53 | 10.49 | 0.11 | 1.18 | 0.40 | 1.20 | 0.04 |
| Lincoln | 0.83 | 1.20 | 4.86 | 4.10 | 2.38 | 6.28 | 29.37 | 1.47 | 3.07 | 0.47 | 2.88 | 0.87 |
| Livingston | 0.95 | 1.05 | 6.08 | 0.18 | 10.51 | 7.81 | 41.26 | 0.79 | 4.59 | 1.38 | 5.75 | 0.76 |
| Madison | 0.14 | 2.05 | 3.31 | 0.20 | 1.70 | 3.01 | 17.10 | 0.06 | 1.16 | 0.43 | 1.11 | 0.12 |
| Morehouse | 0.65 | 1.75 | 2.88 | 1.95 | 4.09 | 3.51 | 17.96 | 0.30 | 1.73 | 0.40 | 2.42 | 0.06 |
| Natchitoches | 1.28 | 1.19 | 5.97 | 6.53 | 3.46 | 4.42 | 32.50 | 3.81 | 4.62 | 0.63 | 3.09 | 3.39 |
| Orleans | 4.67 | 4.74 | 10.57 | 14.35 | 3.83 | 48.30 | 77.37 | 5.32 | 10.50 | 6.63 | 8.02 | 1.10 |
| Ouachita | 3.53 | 3.08 | 9.10 | 11.66 | 9.72 | 20.79 | 64.76 | 9.13 | 13.97 | 3.10 | 8.12 | 7.27 |
| Plaquemines | 0.83 | 1.34 | 1.06 | 36.05 | 1.36 | 16.04 | 8.02 | 10.27 | 3.39 | 4.62 | 1.36 | 6.01 |
| Pointe Coup | 1.25 | 1.60 | 1.88 | 44.98 | 21.39 | 4.50 | 11.10 | 105.06 | 2.71 | 0.54 | 1.19 | 2.09 |

| Parish | NOx Area | NOx Off-road | NOx On-road | NOx Points | CO Area | CO Off-road | CO On-road | CO Points | VOC Area | TOG Off-road | TOG On-road | VOC Points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rapides | 1.75 | 2.96 | 11.46 | 14.99 | 7.46 | 15.91 | 73.36 | 9.27 | 9.26 | 1.93 | 8.08 | 1.60 |
| Red River | 13.22 | 0.65 | 1.70 | 0.56 | 8.61 | 2.57 | 11.30 | 0.42 | 2.52 | 0.72 | 1.83 | 0.34 |
| Richland | 0.50 | 1.44 | 3.42 | 2.00 | 6.49 | 2.56 | 17.59 | 0.94 | 1.89 | 0.27 | 1.56 | 0.31 |
| Sabine | 0.42 | 1.38 | 2.82 | 0.53 | 1.08 | 4.77 | 16.01 | 1.28 | 2.17 | 1.21 | 1.97 | 0.49 |
| St. Bernard | 0.73 | 0.79 | 0.73 | 11.19 | 0.61 | 9.50 | 6.87 | 4.92 | 0.94 | 2.47 | 1.14 | 3.47 |
| St. Charles | 2.11 | 1.58 | 3.51 | 37.62 | 2.31 | 8.42 | 23.71 | 22.56 | 14.96 | 1.32 | 2.48 | 12.74 |
| St. Helena | 0.11 | 0.12 | 0.90 | 1.11 | 0.52 | 0.72 | 5.82 | 0.33 | 1.49 | 0.08 | 0.87 | 0.25 |
| St. James | 0.90 | 0.88 | 1.44 | 14.91 | 1.17 | 2.72 | 8.72 | 6.52 | 6.20 | 0.30 | 0.98 | 3.92 |
| St. J Baptist | 1.07 | 1.05 | 3.64 | 14.28 | 2.88 | 5.89 | 23.98 | 5.17 | 5.57 | 1.15 | 2.63 | 4.51 |
| St. Landry | 1.21 | 2.64 | 6.64 | 3.81 | 8.65 | 8.79 | 42.24 | 1.51 | 5.45 | 1.27 | 5.16 | 2.11 |
| St. Martin | 1.49 | 0.80 | 3.71 | 2.72 | 14.84 | 6.72 | 24.62 | 1.80 | 4.48 | 1.79 | 3.02 | 1.34 |
| St. Mary | 2.46 | 1.73 | 2.60 | 21.26 | 13.83 | 10.33 | 18.63 | 19.40 | 9.56 | 1.35 | 2.14 | 3.66 |
| St. Tammany | 1.82 | 3.85 | 13.27 | 0.07 | 15.81 | 36.33 | 98.25 | 0.00 | 9.64 | 7.12 | 13.49 | 0.05 |
| Tangipahoa | 1.37 | 1.68 | 9.41 | 0.02 | 5.79 | 14.14 | 61.21 | 0.19 | 5.95 | 2.55 | 6.91 | 0.34 |
| Tensas | 0.18 | 1.03 | 1.25 | 0.00 | 3.65 | 2.15 | 6.07 | 0.00 | 1.37 | 0.41 | 0.52 | 0.00 |
| Terrebonne | 1.92 | 2.30 | 5.00 | 2.89 | 3.55 | 25.98 | 39.91 | 3.70 | 4.41 | 5.13 | 6.06 | 1.82 |
| Union | 0.73 | 0.43 | 2.57 | 0.55 | 3.26 | 3.87 | 14.15 | 0.32 | 2.50 | 0.47 | 1.78 | 0.45 |
| Vermilion | 1.31 | 1.47 | 3.25 | 9.40 | 11.64 | 11.63 | 21.92 | 3.52 | 3.85 | 2.57 | 3.15 | 1.46 |
| Vernon | 0.19 | 1.21 | 3.91 | 0.14 | 1.13 | 4.74 | 24.50 | 0.08 | 1.90 | 0.94 | 3.27 | 0.12 |
| Washington | 0.82 | 0.45 | 1.98 | 11.11 | 2.88 | 3.20 | 14.24 | 21.17 | 3.47 | 0.30 | 2.28 | 4.78 |
| Webster | 1.69 | 0.85 | 4.02 | 3.16 | 2.69 | 4.35 | 24.89 | 2.67 | 4.40 | 0.47 | 2.74 | 1.79 |
| W Baton Rouge | 1.26 | 0.84 | 2.23 | 3.21 | 6.26 | 7.61 | 12.59 | 6.36 | 4.08 | 1.06 | 1.22 | 1.68 |
| West Carroll | 0.37 | 0.55 | 0.87 | 2.38 | 7.21 | 1.42 | 5.46 | 0.23 | 1.18 | 0.14 | 0.78 | 0.06 |
| West Feliciana | 0.32 | 0.29 | 0.95 | 1.34 | 1.16 | 1.51 | 5.47 | 1.29 | 0.87 | 0.24 | 0.69 | 0.33 |
| Winn | 0.41 | 0.27 | 2.81 | 0.88 | 0.75 | 1.91 | 14.53 | 3.60 | 2.42 | 0.20 | 1.32 | 2.25 |
| **Total** | 144.39 | 105.79 | 276.31 | 530.61 | 378.48 | 676.38 | 1847.05 | 414.08 | 379.09 | 100.75 | 228.67 | 156.51 |

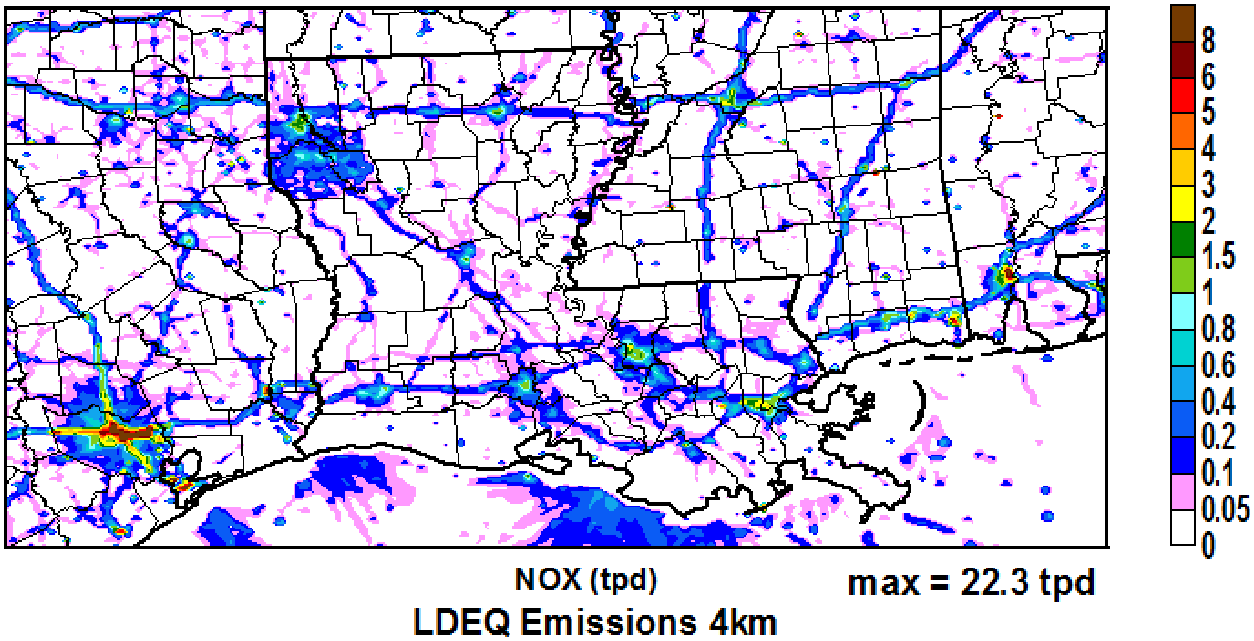



**Figure 5-10. Spatial distribution of total (anthropogenic and biogenic) weekday surface NOx emissions (tons/day) in 2010.**

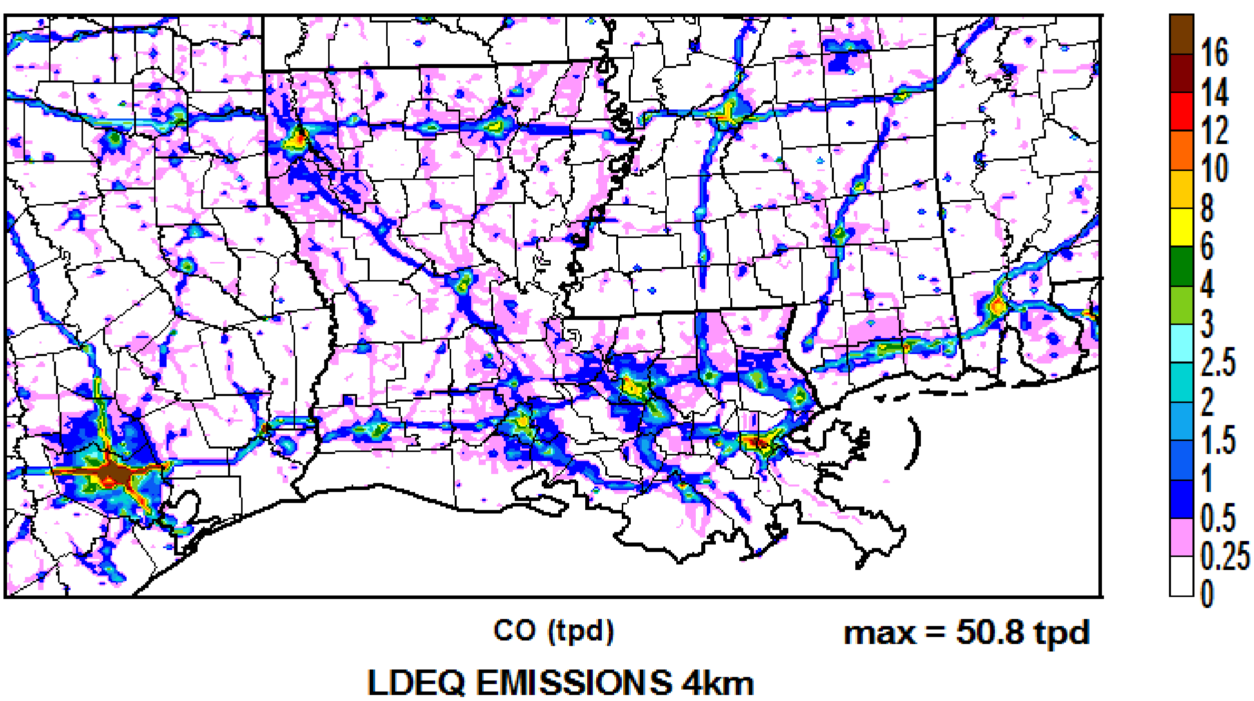



**Figure 5-11. Spatial distribution of total weekday surface CO emissions (tons/day) in 2010.**

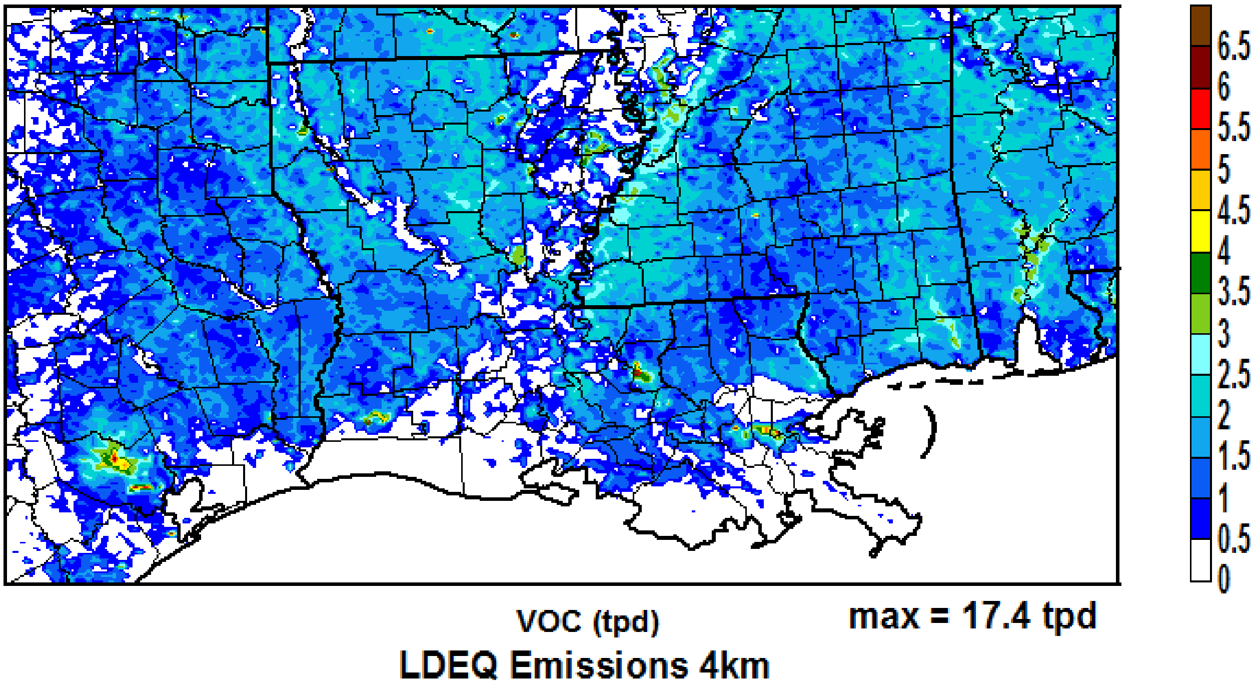



**Figure 5-12. Spatial distribution of total (anthropogenic and biogenic) weekday surface VOC emissions (tons/day) in 2010.**

# 6.0 BASE YEAR MODEL PERFORMANCE EVALUATION

The Comprehensive Air quality Model with extensions (CAMx) was used to simulate ozone levels throughout Louisiana during the period of September 1 to October 31, 2010. The methodology described in this section comprised the base year component of the wider modeling program designed to provide the technical underpinnings of the attainment demonstration for the 2008 8-hour ozone NAAQS. The base year modeling was conducted according to the approach described in the Modeling Protocol (ENVIRON and ERG, 2012) and follows the photochemical modeling guidance established by the EPA (2007).

All ozone simulations were run on the nested grid domains shown in Figures 4-1 using CAMx v5.4 (ENVIRON, 2011). Predictions of ozone were compared to measurements recorded at monitoring sites throughout Louisiana (Figure 2-1), while predictions of NOx and VOC precursors were evaluated against monitoring measurements in the Baton Rouge area (Figure 5-1). A multitude of CAMx diagnostic runs were conducted and evaluated in an effort to improve model performance and to characterize ozone sensitivity to changes in various model inputs.

## 6.1 Overview and Context

A model performance evaluation (MPE) is the process of testing a model's ability to accurately estimate observed atmospheric properties over a range of spatial, temporal, and geophysical conditions. In general terms, the process to establish reliable photochemical modeling consists of the following cycle:

- Exercise the modeling system for the base year, attempting to replicate the time and space behavior of observed ozone concentrations as well as concentrations of precursor and product species;
- Identify sources of error and/or compensating biases, through evaluation of pre-processor models (e.g., WRF, EPS3), air quality model inputs, mass budgets and conservation, process analysis, etc.;
- Through a documented process of diagnostic and sensitivity investigation, pinpoint and correct the performance problems via model refinement, additional data collection and/or analysis, or theoretical considerations;
- Re-run the model for the base year and re-evaluate performance until adequate, justifiable performance is achieved, or time and/or resources are expended, or the episode is declared unsuited for further use based on documented performance problems.

To the extent possible, these steps were undertaken by the modeling team, culminating in a modeling application exhibiting sufficiently minimal bias and error that it can be used reliably to perform the 8-hour ozone attainment demonstration. The modeling team selected the final model configuration for the CAMx base year simulation based on the following factors:

- Model performance obtained using the initial model configuration and input data;

- Model performance impacts from diagnostic sensitivity tests;
- The modeling team's knowledge and experience with model options and their associated performance attributes;
- Experience performing sensitivity tests and model performance evaluation for a multitude of other local and regional applications;
- Comments from EPA and other participants.

The objective in identifying the optimum model configuration is to obtain the best performance for the right reasons consistent with sound science and EPA guidance. Sometimes, decisions must be made that trade off better/poorer model performance for one pollutant against another. These factors were considered and potential issues discussed among the LDEQ modeling team, EPA and others.

### 6.1.1 Evaluation Datasets

A variety of chemical concentration measurements were available for the MPE phase of the project. Available air quality monitoring data were extracted from the following network databases:

Air Quality System (AQS): Hourly ozone and NOx concentration measurements were extracted for sites shown in Figure 4-1. Typical surface measurements include ground-level (i.e., 2 to 10 m) ozone, $NO_2$, NOx and CO.

Photochemical Assessment Monitoring Sites (PAMS): Four PAMS sites operated in Baton Rouge in 2010. These PAMS sites are co-located with the Capitol, LSU, Pride and Bayou Plaquemine AQS sites (Figure 5-1). PAMS sites collect ground-level ozone, NOx, hydrocarbons, and other parameters. Multi-hour concentrations for 55 individual hydrocarbons are determined from canister samples.

Clean Air Status and Trends Network (CASTNET): these sites monitor rural ground-level gas and PM pollutant concentrations. Hourly ozone concentrations from CASTNET sites in the south-central US were used to evaluate model performance at the regional scale.

### 6.1.2 Model Configuration

The initial CAMx base year simulation ("Run 1") used the meteorological, emissions, and ancillary input datasets described in Sections 4 and 5. The model simulated the evolution of ozone and precursor concentrations over the entirety of September and October 2010. A spinup period between August 15-31 was run to ensure a chemically balanced simulation and to remove the effects of initial conditions at coarse resolution.

CAMx provides some run-time options that need to be set for each specific simulation. Most options and capabilities are defined or provided to the model through the various input files. The CAMx configuration for the initial base year simulation is listed below (see ENVIRON [2011] for specific details):

- Time zone: Central Standard Time (CST)
- I/O frequency: 1 hour
- Map projection: Lambert conformal (see Section 4.1)
- Nesting: 2-way fully interactive 36/12/4-km computational grids (Figure 4-1)
- Chemistry mechanism: CB6 gas-phase only (without PM)
- Chemistry solver: Euler-Backwards Iterative (EBI)
- Advection solver: Piecewise Parabolic Method (PPM)
- Plume-in-Grid sub-model: Off
- Probing Tools: Off
- Asymmetric Convective Model: On
- Photolysis Adjustments for Clouds: in-line TUV
- Photolysis Adjustment for Aerosols: input AHOMAP
- Dry deposition: Zhang03
- Wet deposition: On

## 6.2 Initial CAMx Run

Figure 6-1 presents spatial plots of maximum daily 8-hour (MDA8) ozone over the 4-km nested grid on days when ozone exceeded the 2008 ozone NAAQS at any location in Louisiana. Simulated ozone was over predicted substantially on a vast majority of these days. Relative to observed MDA8 concentrations in Baton Rouge, over predictions in excess of 15-20 ppb covered large portions of the area, especially in mid-September. In particular, the highest simulated ozone occurred on September 14, reaching 190 ppb to the northeast of Baton Rouge and exceeding certain measurements by up to 30 ppb. The 190 ppb simulated peak occurred near a large prescribed fire complex according to the FINN fire inventory and State fire reports, but nearby monitoring indicated ozone reaching less than 60 ppb.

Statistical model performance was calculated for 1-hour ozone for four areas of the state that exceed (Baton Rouge) or nearly exceed (Shreveport, New Orleans, Lake Charles) the 2008 ozone NAAQS. Daily average normalized bias and gross error were calculated for all prediction-observation pairs at all sites when observed ozone exceeded 40 ppb following EPA's modeling guidance (EPA, 2007). This guidance de-emphasizes the use of statistical "goals" for 8-hour ozone as a means of defining acceptable model performance, and instead stresses performing corroborative and confirmatory analysis to assure that the model is working correctly. Older 1-hour ozone modeling guidance (EPA, 1991) established performance goals for certain statistical parameters, including mean normalized bias (< ±15%) and mean normalized gross error (< 35%), respectively. While now considered obsolete, these 1-hour statistical metrics nevertheless provide established benchmarks that modern photochemical models should be expected to achieve.

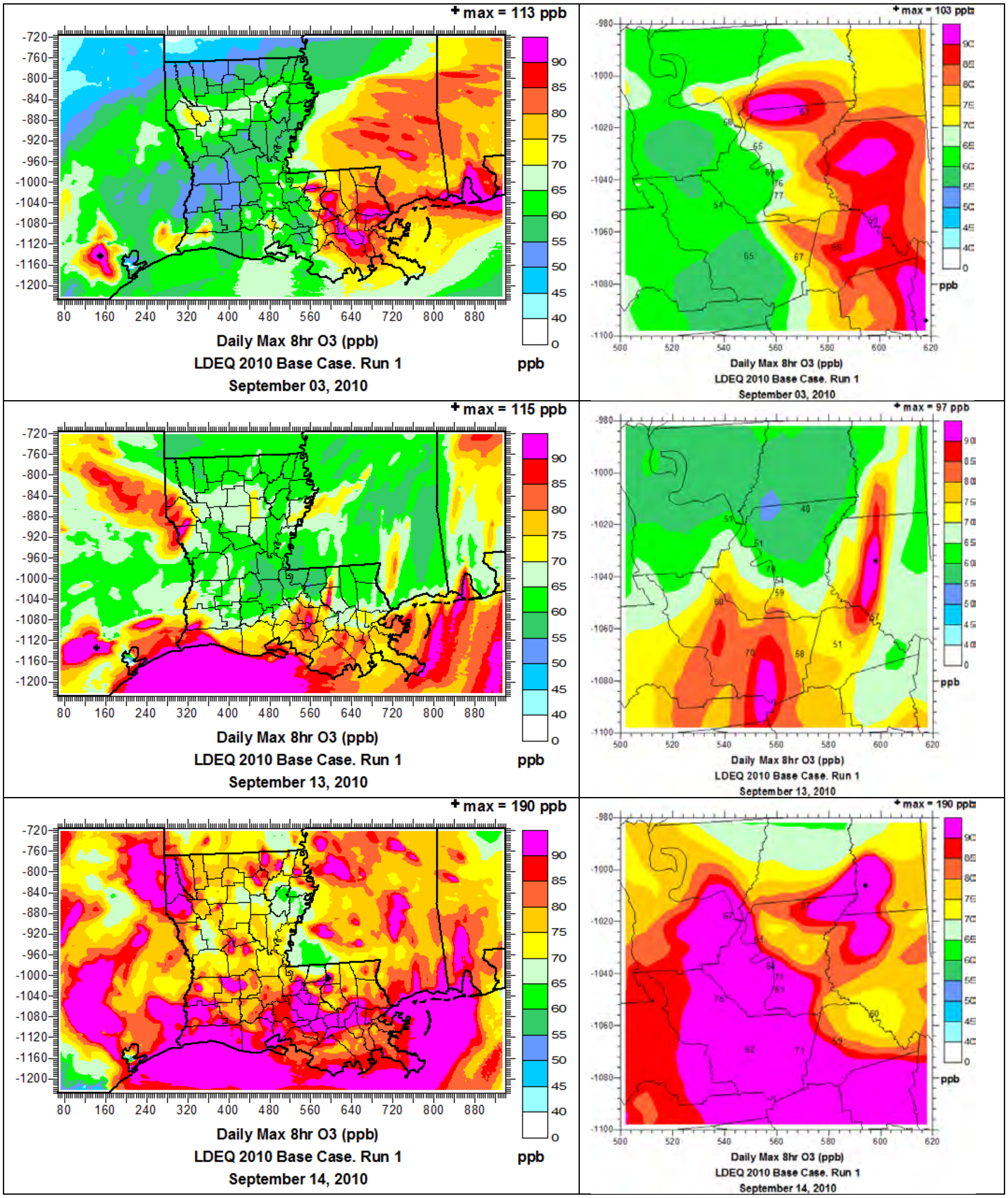



**Figure 6-1. Spatial distribution of predicted MDA8 ozone (ppb) from the initial base year run on days exceeding the 2008 ozone NAAQS in Louisiana. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right).**

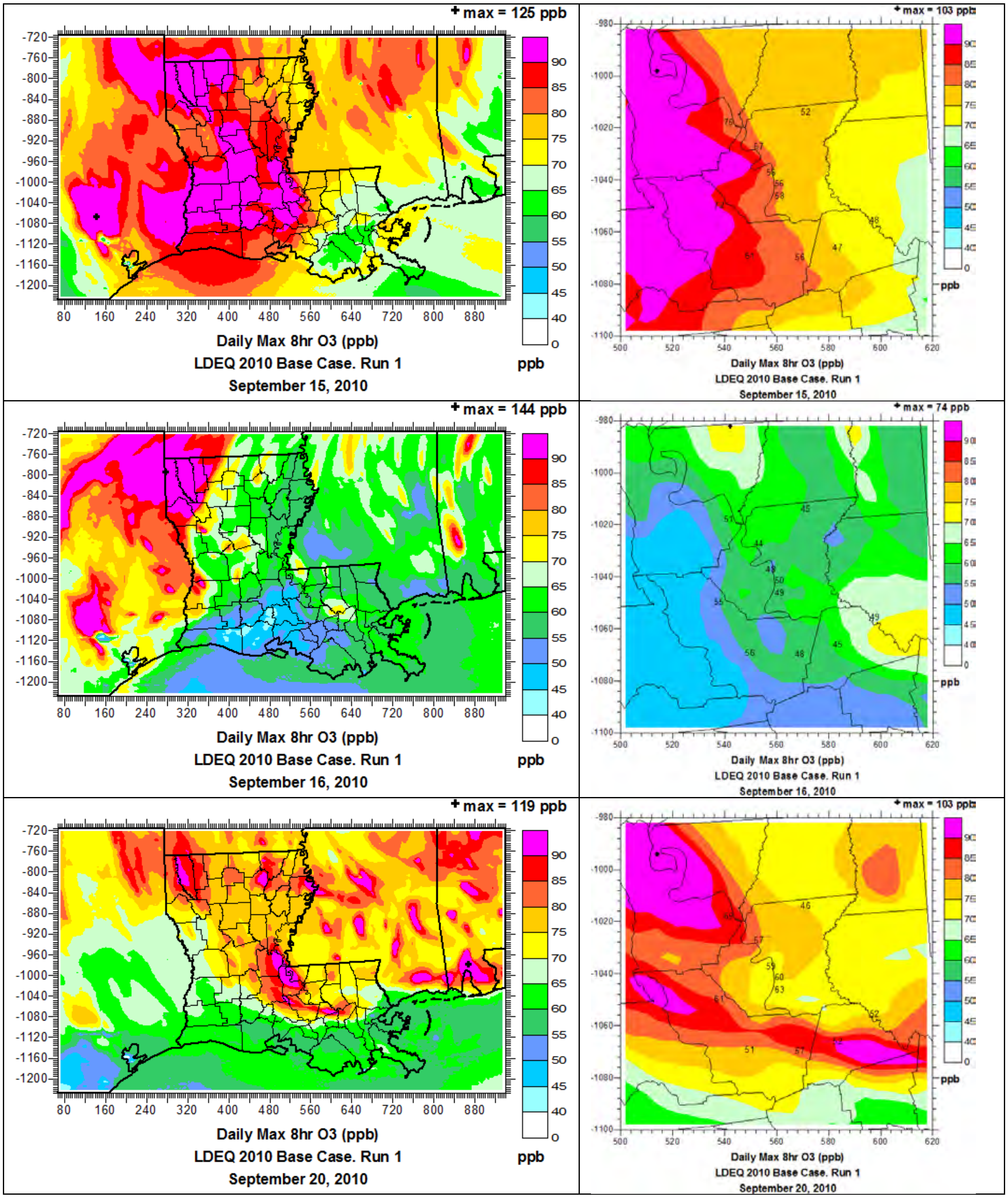



**Figure 6-1 (continued).**

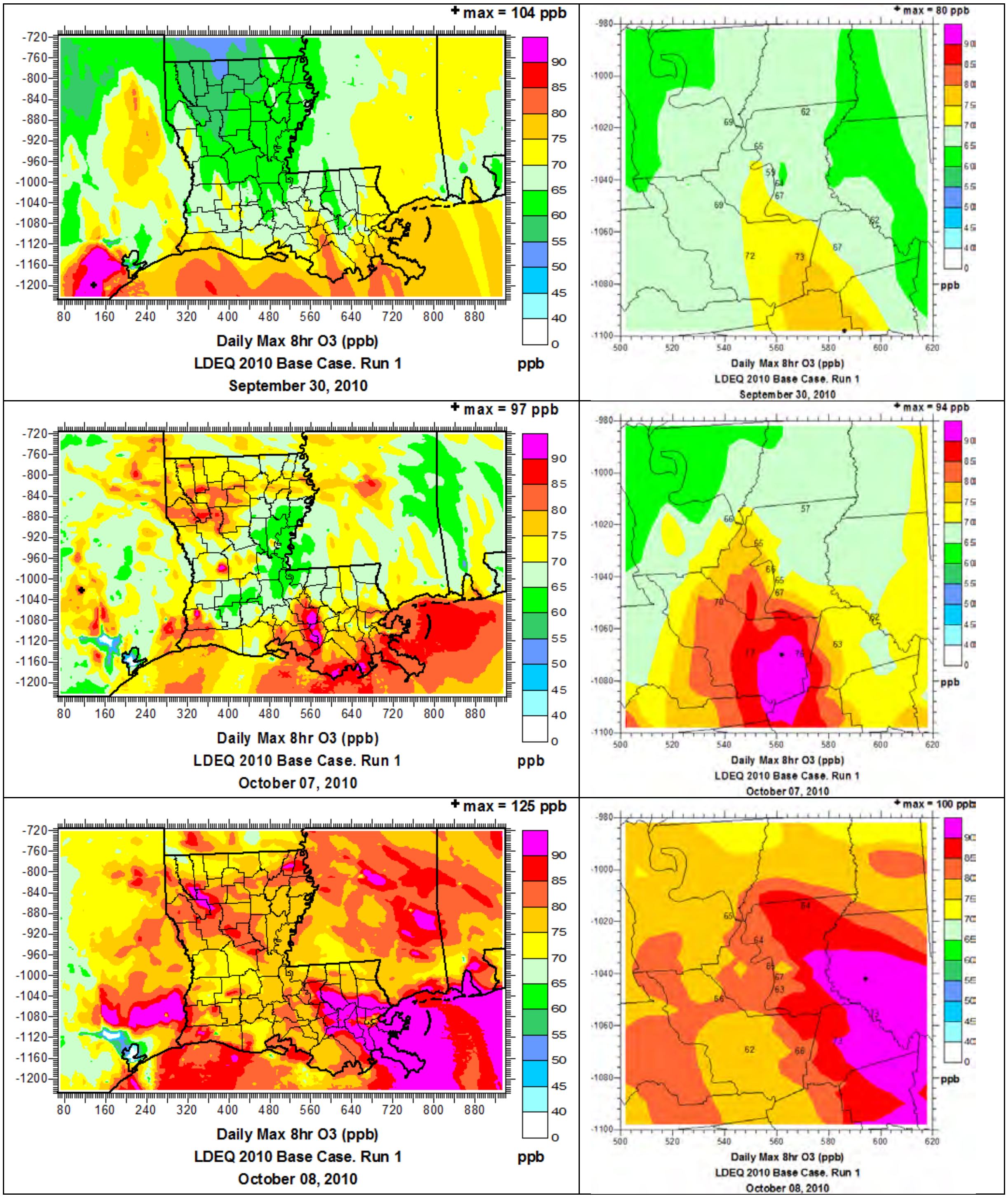



**Figure 6-1 (continued).**

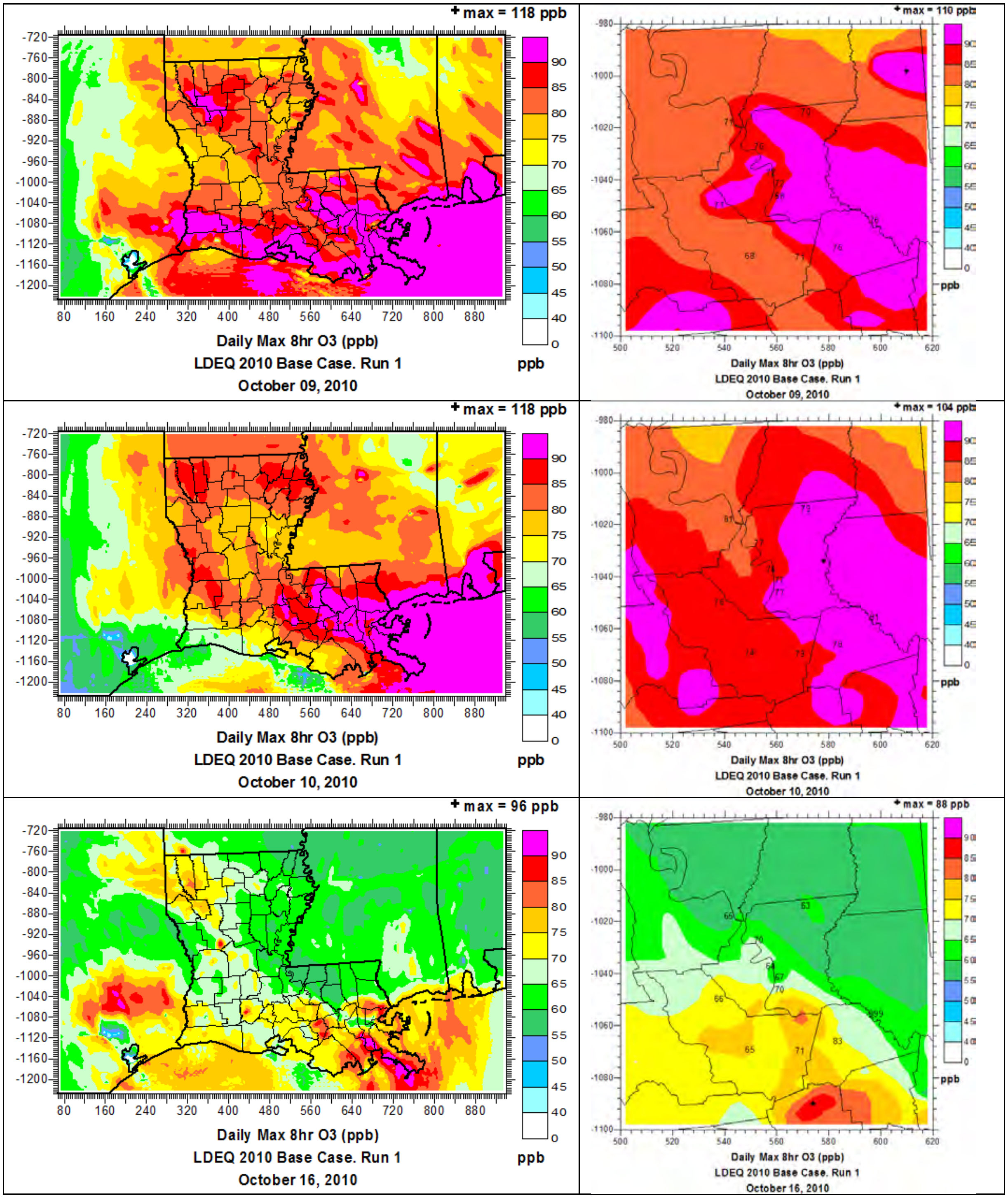



**Figure 6-1 (continued).**

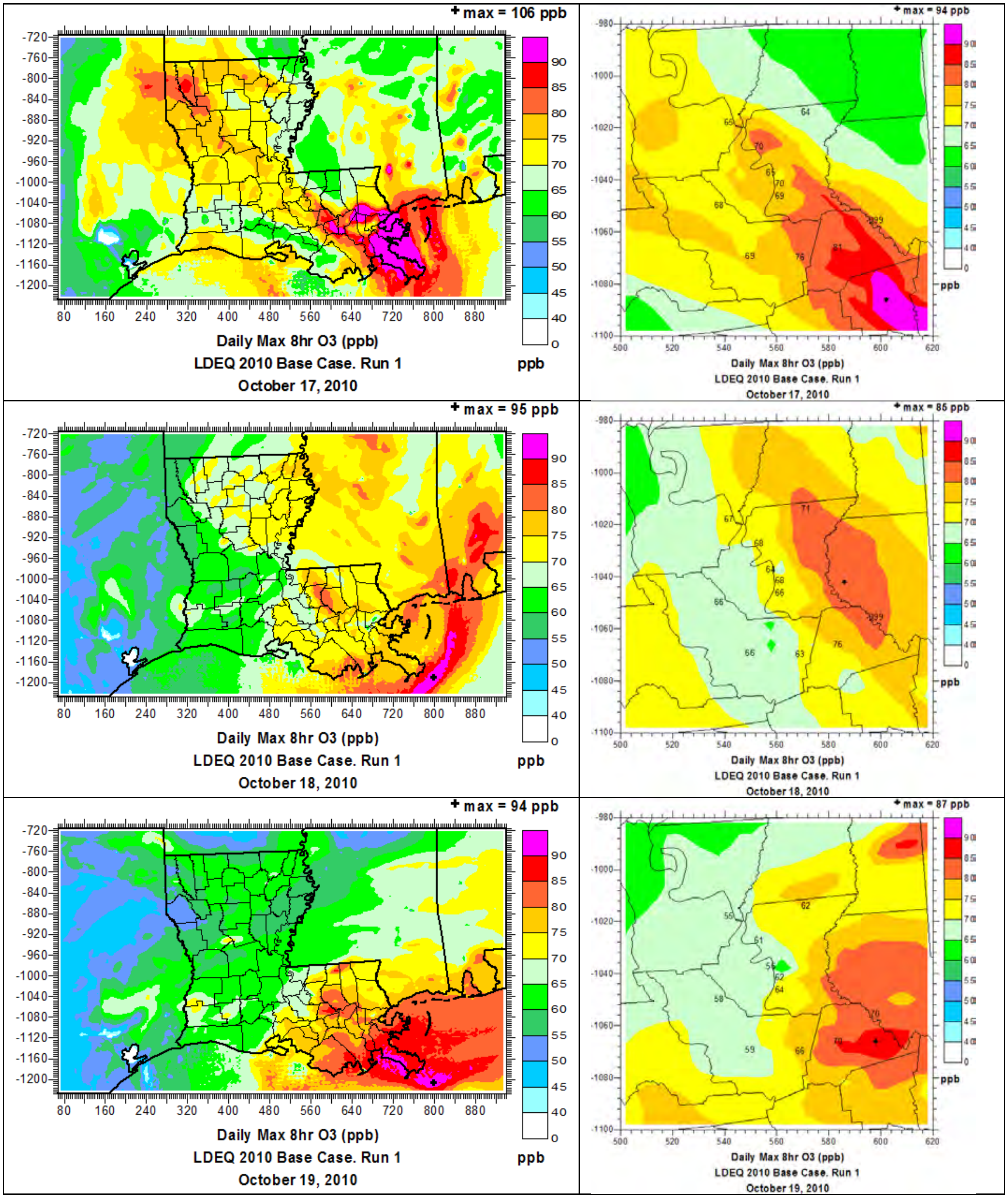



**Figure 6-1 (concluded).**

Time series of daily statistics for Baton Rouge are shown in Figure 6-2; the old 1-hour goals for normalized bias and gross error are also shown for reference. Performance in September was clearly worse than in October. The pattern for over prediction bias in September was consistently 30-50% and not particularly related to observed levels, whereas over prediction patterns in October tended to be associated with high ozone episodes.

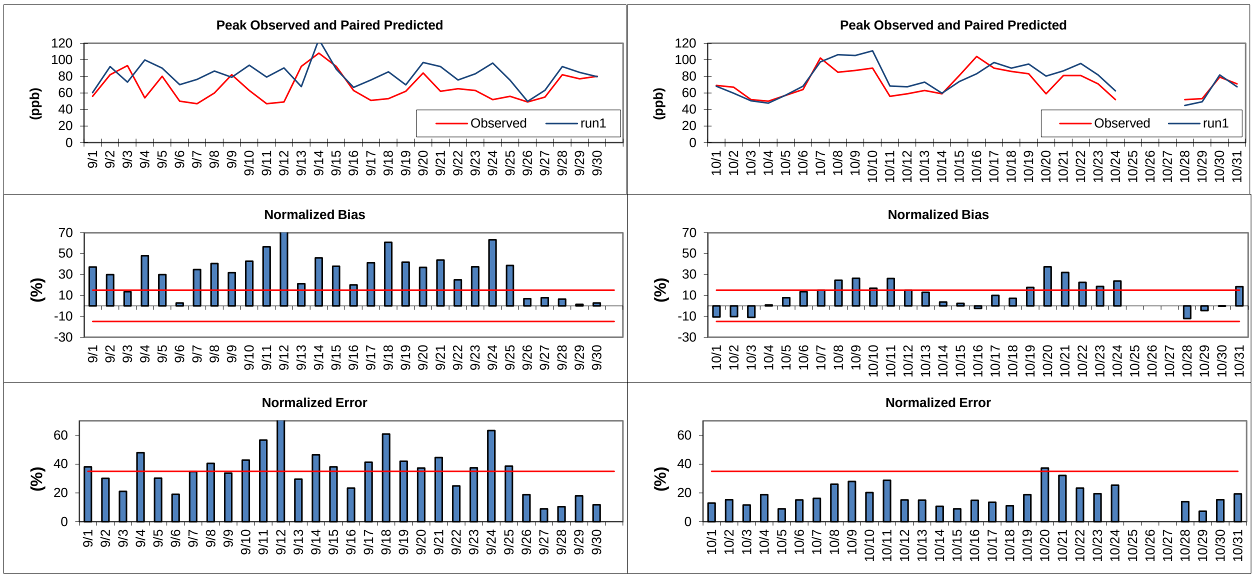
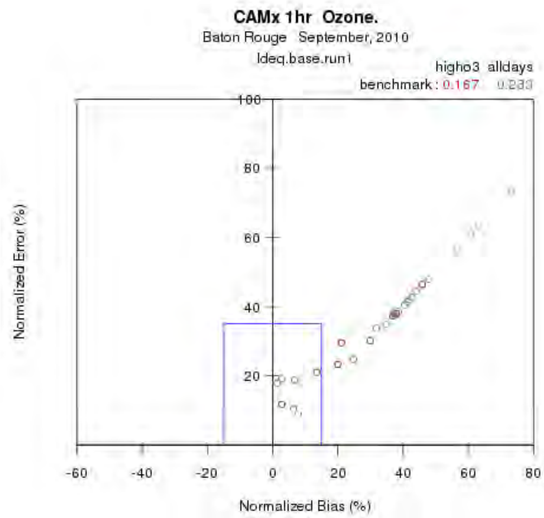



**Figure 6-2. Daily statistical performance for the initial base year run at all Baton Rouge monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: maximum daily peak 1-hour observed ozone (red) and paired simulated peak at the same site (blue). Middle row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines).**

Figure 6-3 presents the same data shown for the daily bias and error statistics in Figure 6-2, but in terms of a two-dimensional error space, with bias on the horizontal axis and gross error on the vertical axis. The 1-hour benchmarks have been plotted to represent a “goal” within which the bulk of paired daily bias and gross error points should fall to indicate a well-performing model. We have plotted the error points in different colors; those in red signify the ozone exceedance days in Louisiana as shown in Figure 6-1. Each figure notes the fraction of days within the goal. In Baton Rouge, the September over prediction bias is clearly evident for most days, regardless of observed ozone level. Performance in October was better but also exhibited an over prediction tendency.

Similar plots are shown for New Orleans, Shreveport, and Lake Charles in Figures 6-4 through 6-6, respectively. Large over predictions are evident in all cases, although Shreveport performance in September was not as extreme as in the southern cities.

September




October

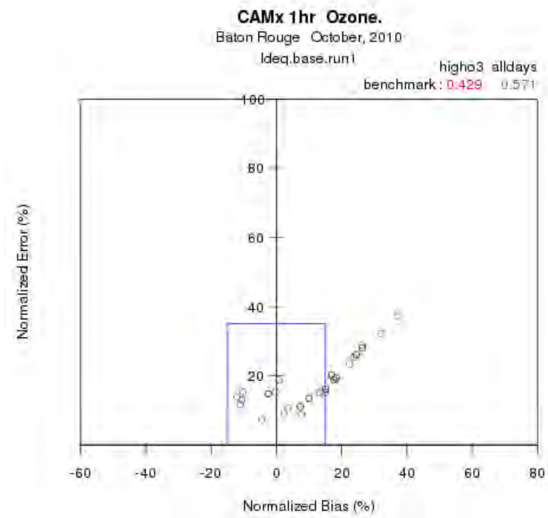
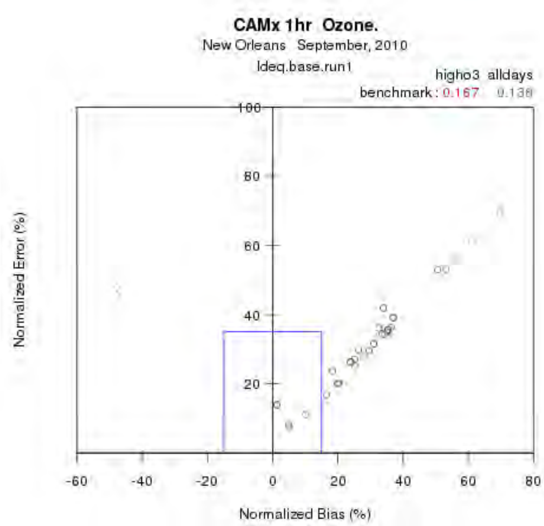



**Figure 6-3. "Goal" plots of daily normalized bias and error from the initial base year run in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

September




October

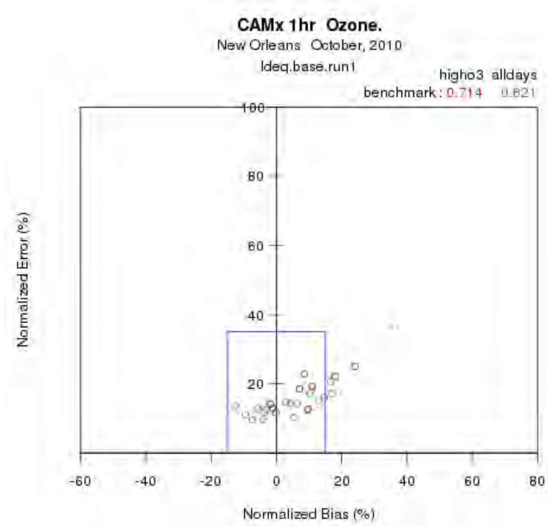



**Figure 6-4. "Goal" plots of daily normalized bias and error from the initial base year run in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

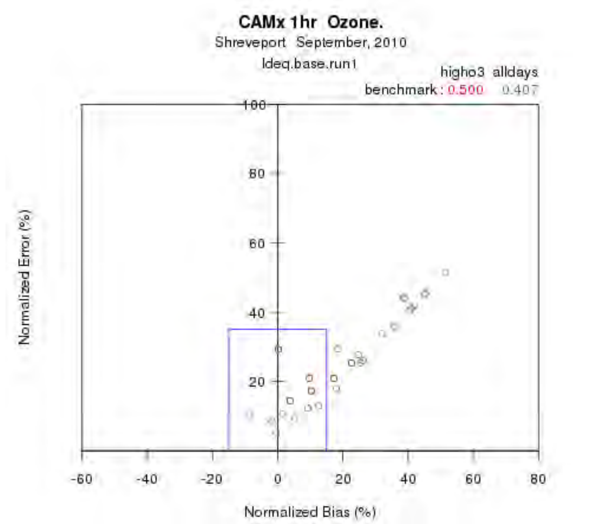
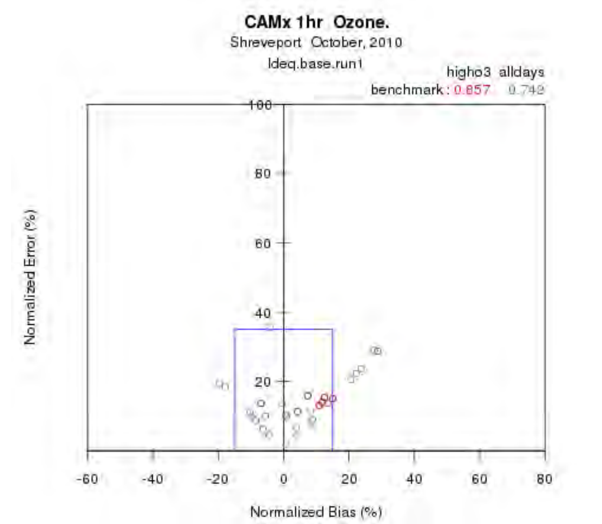
| September | October |
| --- | --- |
|  |  |





**Figure 6-5. "Goal" plots of daily normalized bias and error from the initial base year run in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

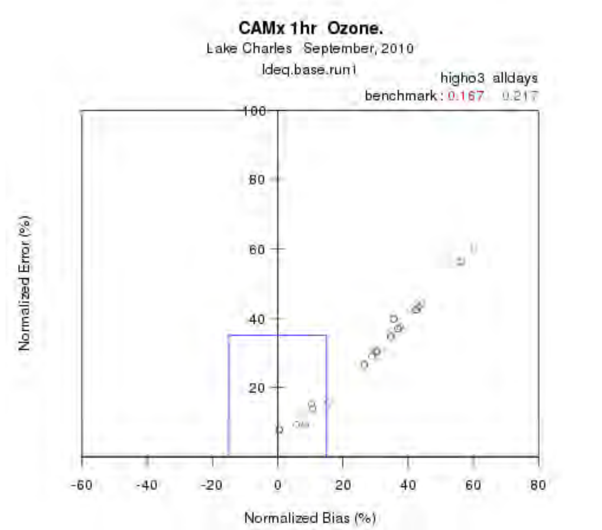
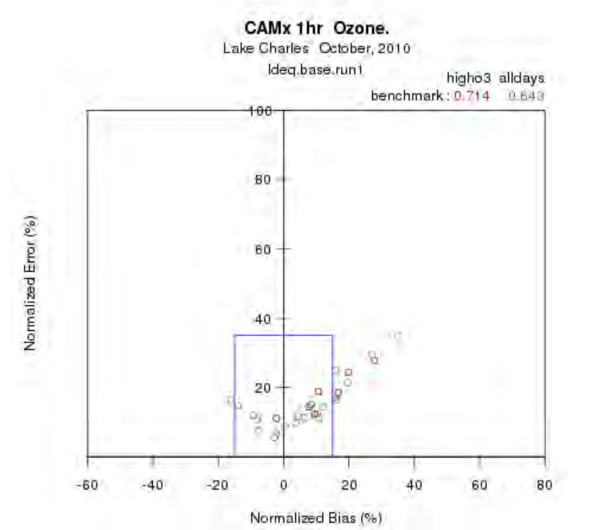
| September | October |
| --- | --- |
|  |  |





**Figure 6-6. "Goal" plots of daily normalized bias and error from the initial base year run in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

Time series of simulated and observed hourly ozone and NOx at the urban LSU monitor throughout September and October are shown in Figures 6-7 and 6-8, respectively. Among all Baton Rouge sites, the LSU monitor recorded the highest ozone of the modeling period. In September, daily ozone over predictions occurred for most hours, although they were more extreme during the daytime. Performance was much better in October, when only a few of the highest ozone days exhibited similarly large over predictions. Hourly NOx concentrations were simulated well at LSU, especially during the daytime. The only exceptions were for occasional peak nighttime values when the model under predicted NOx by factors of up to 2 or 3. The under prediction of nighttime NOx is not likely related to improper characterization of nighttime emissions, but rather to an inability to resolve local emission at 4 km grid scale (i.e., over-dilution to grid volume) and meteorological influences such as excessive nocturnal vertical mixing.

Similar time series for ozone and NOx are shown at the Dutchtown monitor in Figures 6-9 and 6-10; this site represents a high NOx emissions site as it is located very near the I-10 freeway south of Baton Rouge. Similar large daytime ozone over prediction patterns occurred at this site in September, and perhaps better performance occurred in October at Dutchtown than at LSU. Predicted and observed NOx agreed rather well, with generally higher NOx and much more diurnal variability (as expected). It is possible that higher levels of fresh NOx emissions predicted at Dutchtown may have controlled ozone over predictions to some extent through chemical scavenging.

A final set of time series is shown for the rural Pride site in Figures 6-11 and 6-12, which is located northwest of Baton Rouge. From the standpoint of daily peak hourly ozone, over predictions were not as extreme as at LSU, but the entire time series exhibited over predictions for very nearly every hour of both months. In particular, nighttime ozone was far too high, taking on the characteristics typical of rural background ozone with small diurnal amplitude that is not influenced by scavenging from local NOx. However, the observations clearly show nightly ozone scavenging to zero each night. Indeed, NOx observations were surprisingly high for a rural site, and likely indicated a local source that contributed to nightly ozone reductions around the monitor. NOx tended to be under predicted, but even during the few nights with over predictions, simulated ozone was not greatly affected.

The consistent dichotomy in ozone performance between September and October across all regions of Louisiana suggests a fundamental and systematic difference in the characterization of the photochemical environment. The two most obvious inputs that define this environment are meteorology and emissions, and their impacts may not be mutually independent. For example, temperature is very influential for various important emissions categories (e.g., biogenic and on-road sources), while wind patterns affect the source mix contributing to high ozone levels. Figures 6-13 and 6-14 reiterate the wind direction and temperature patterns, respectively, that were prevalent in southern Louisiana during September and October of 2010. Note that September was warm with winds from the east, while October was much cooler with winds from the west. At least meteorologically, these two months were indeed very different.

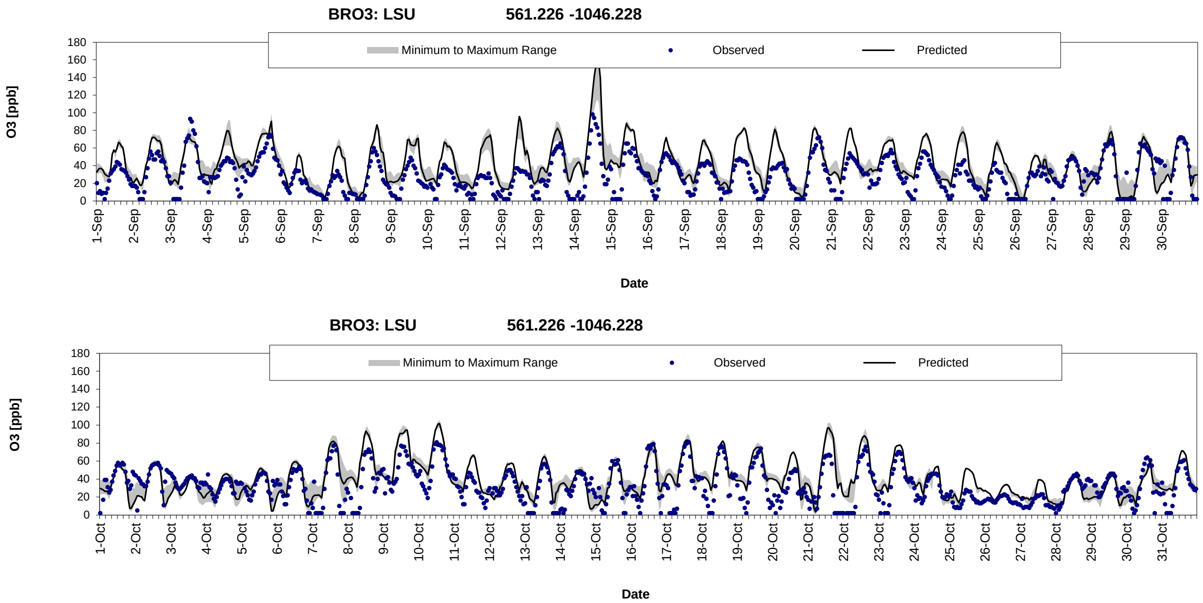



**Figure 6-7. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the LSU monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor.**

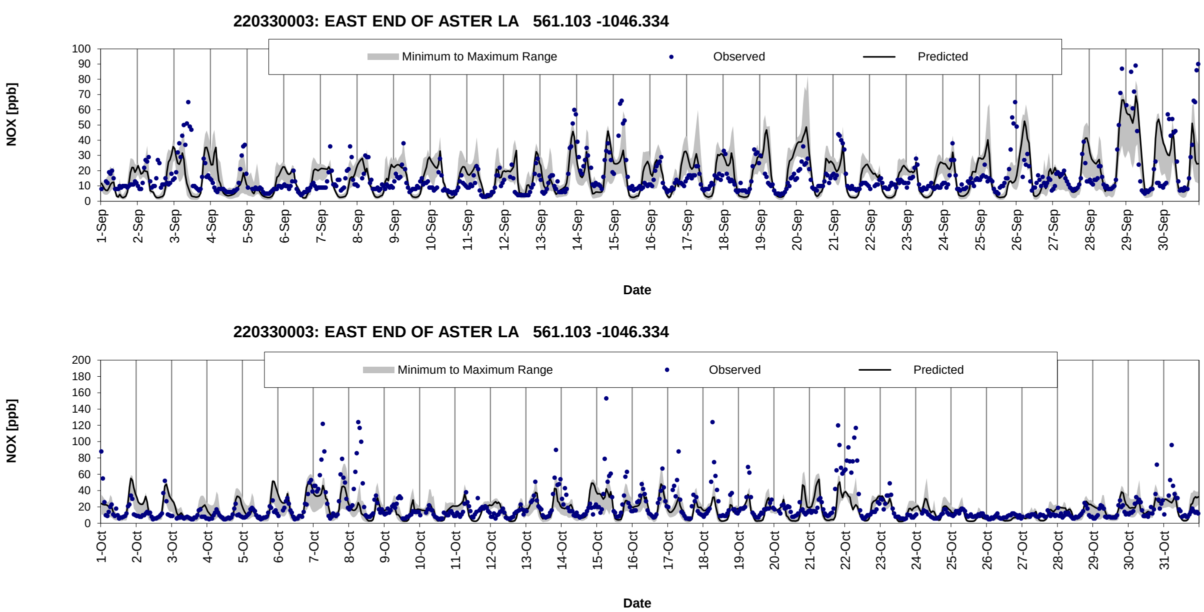



**Figure 6-8. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the LSU monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor.**

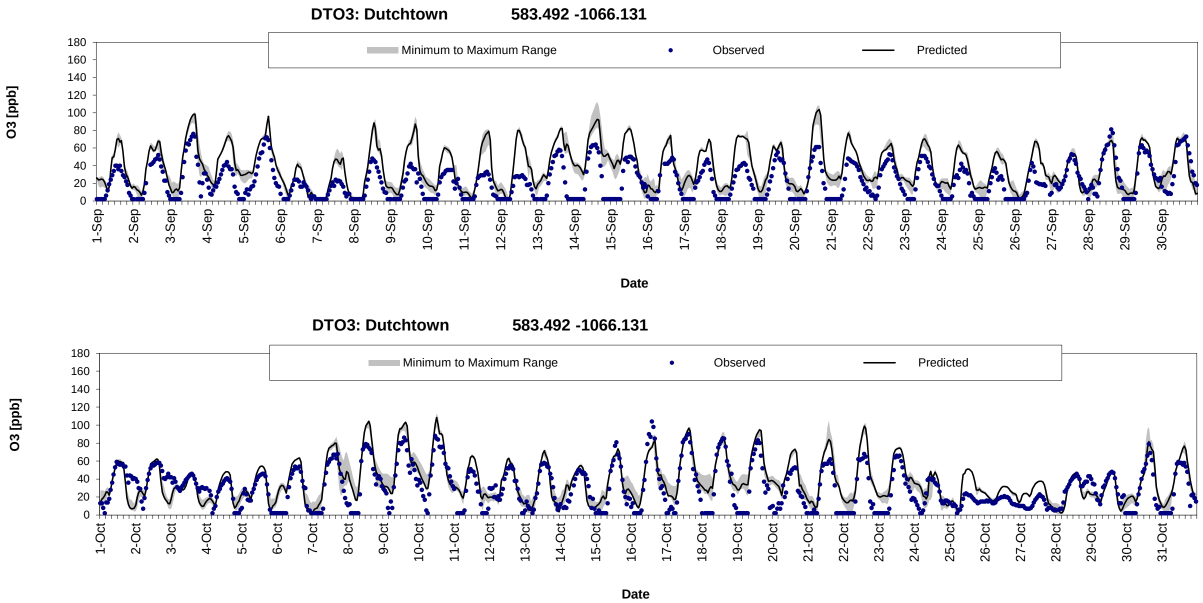



**Figure 6-9. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the Dutchtown monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor.**

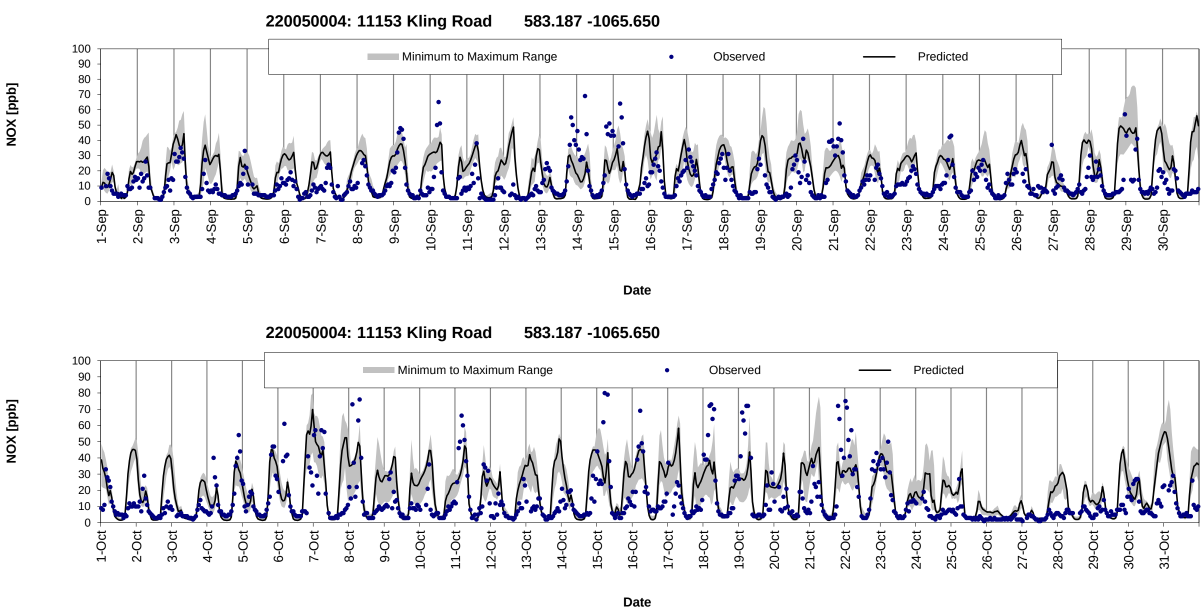



**Figure 6-10. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the Dutchtown monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor.**

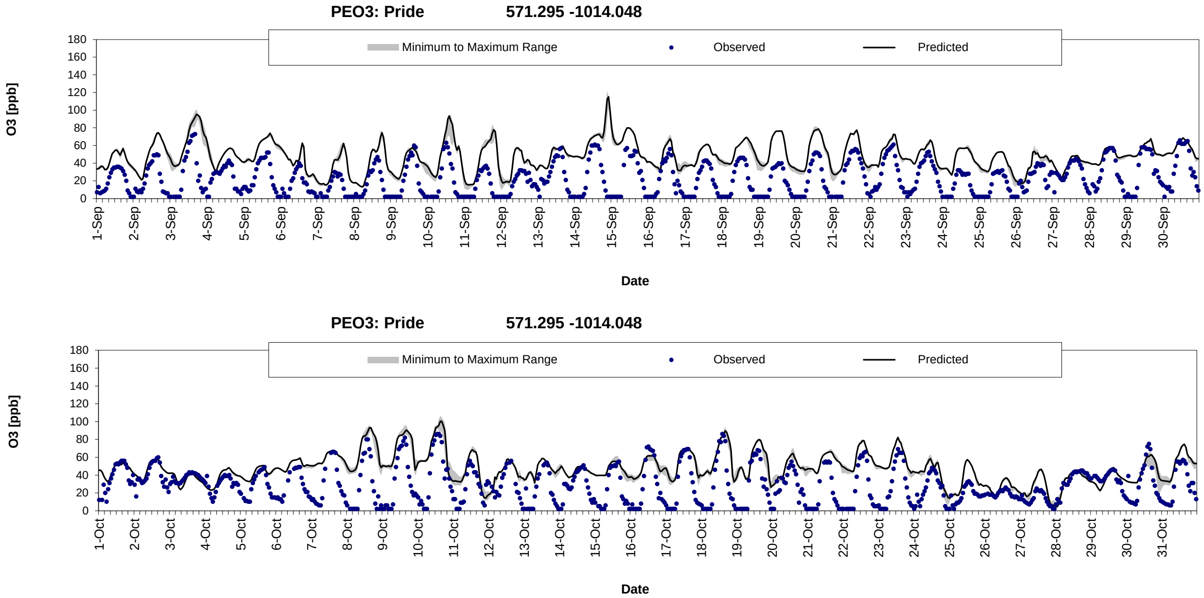



**Figure 6-11. Hourly time series of observed (blue dots) and predicted (solid line) ozone at the Pride monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted ozone among the nine grid cells surrounding the monitor.**

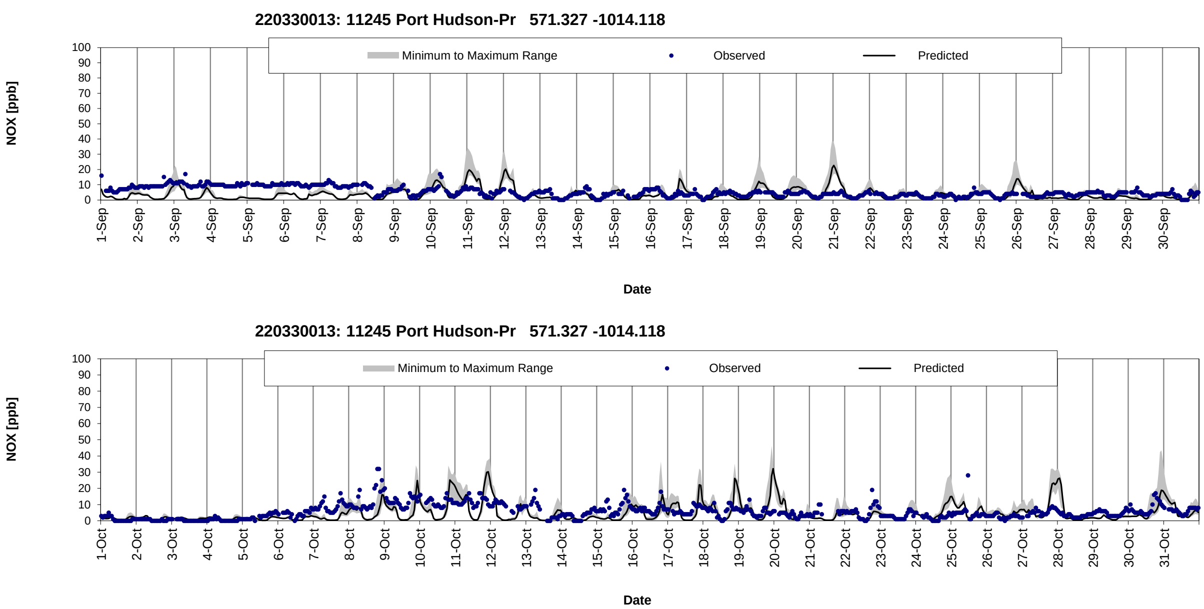



**Figure 6-12. Hourly time series of observed (blue dots) and predicted (solid line) NOx at the Pride monitoring site during September (top) and October (bottom). Grey shading indicates the range of predicted NOx among the nine grid cells surrounding the monitor.**

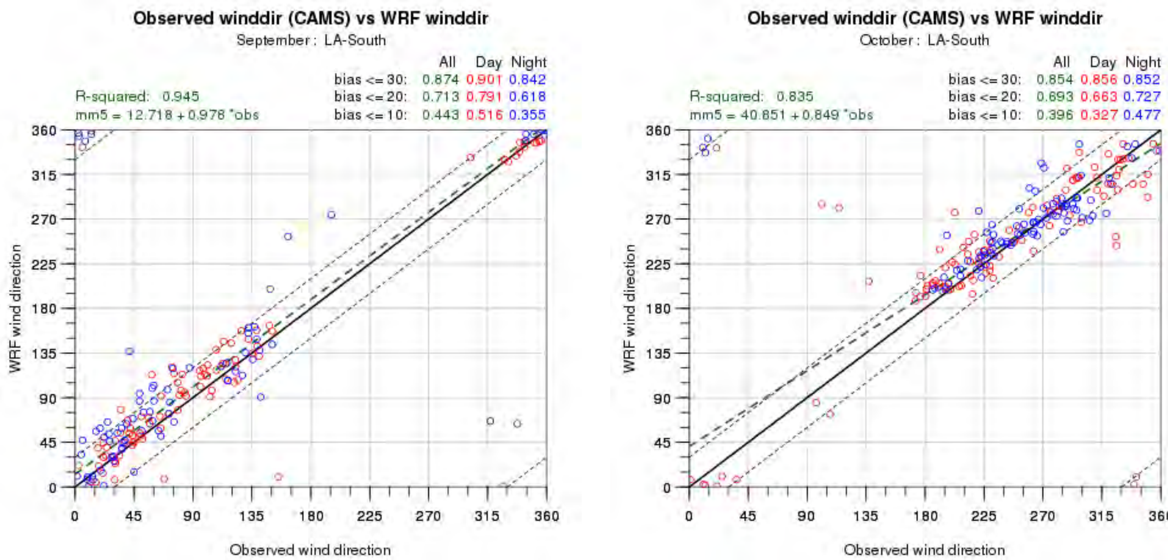



**Figure 6-13. WRF performance for wind direction against observations in southern Louisiana in September (left) and October (right). Figure is duplicated from Figure 3-10.**

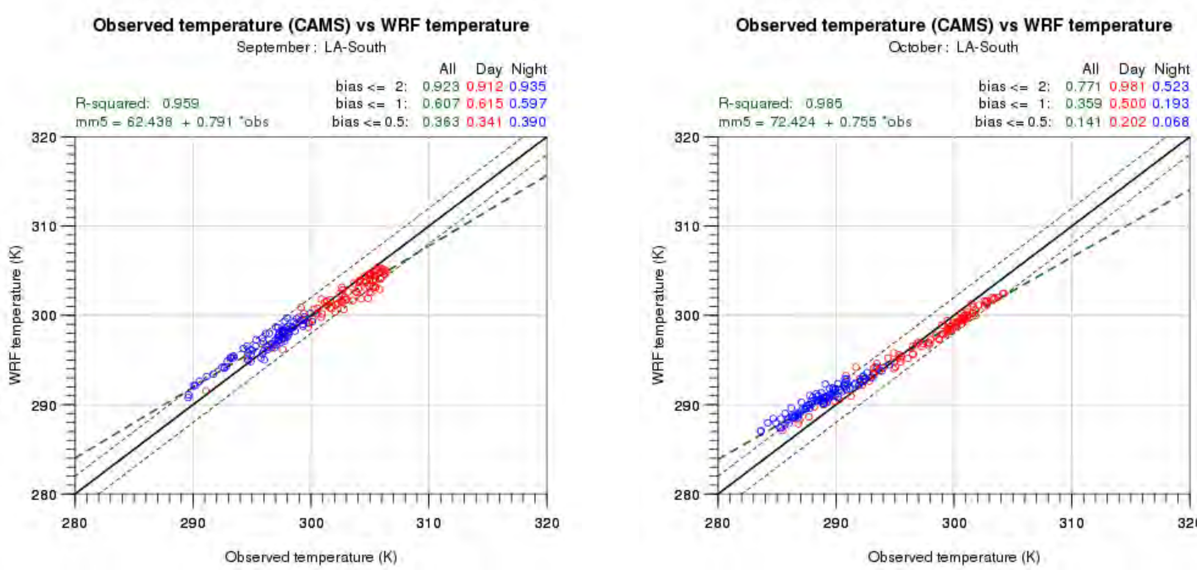



**Figure 6-14. WRF performance for temperature against observations in southern Louisiana in September (left) and October (right). Figure is duplicated from Figure 3-14.**

## 6.3 Diagnostic Sensitivity Testing (Phase 1)

A series of diagnostic sensitivity tests were conducted for the month of September to identify and potentially rectify the ubiquitous ozone over predictions evident from the initial base year run. Table 6-1 summarizes each of the Phase 1 sensitivity tests, including their purpose and their results.

**Table 6-1. Phase 1 diagnostic sensitivity tests performed on the CAMx 2010 base year simulation.**

| Run ID | Purpose | Results |
|---|---|---|
| 2 | Remove all wildfire emissions to isolate their impact | Large local ozone reductions in fire plumes;<br>Minor regional ozone reductions;<br>Negligible impact on statistical performance |
| 3 | Remove Kv "patching" to quantify its impact | Negligible impact on daytime NOx and ozone;<br>Increased nighttime NOx, lower nighttime ozone;<br>Better nighttime ozone performance |
| 5 | Remove wildfire NOx emissions to verify it as the driver for locally high ozone | Nearly identical results to Run 2;<br>Confirms NOx-sensitive rural conditions |
| 6 | Calculate Kv from WRF/YSU technique to test sensitivity to Kv approach | Minor mixed impacts on MDA8 patterns;<br>Mostly higher ozone |
| 7 | Replace CB6 chemistry with Carbon Bond 2005 (CB05) to test sensitivity to choice of mechanism | Large widespread reductions in MDA8 ozone;<br>Improved statistical performance |
| 8 | Scale MOVES on-road emissions in 4 km domain to emulate MOBILE6; derived from 2008 EPA NEI for LA parishes (30% NOx reduction, 34% VOC increase) | Minor impacts to statistical performance;<br>Minor mixed impacts on MDA8 patterns;<br>Confirms VOC-sensitive urban conditions;<br>LDEQ elected to stay with MOVES |
| 9 | Scale wildfire NOx down by 80%, add emissions of PAN and $HNO_3$ to represent aged NOy | Moderate local ozone reductions in fire plumes;<br>Minor regional ozone reductions;<br>Negligible impact on statistical performance |

We also analyzed other issues beyond additional CAMx simulations, including:

- *Does the gasoline RVP switch in late September impact on-road emissions?* We evaluated daily total on-road emissions for each day throughout September and October. No obvious RVP signal was seen, and the largest day-to-day variation was caused by temperature fluctuations.
- *Were any emissions double-counted during processing into model-ready inputs?* Further quality assurance checks revealed no double-counting.
- *Are biogenic isoprene emissions too high?* Other concurrent regional modeling efforts have observed that MEGAN isoprene estimates in the eastern US are much higher than other models, such as EPA's Biogenic Emission Inventory System (BEIS), thereby contributing to ozone over predictions. September isoprene emissions in the 4 km grid were about two times higher than in October. A review of 8-day satellite vegetative fields exhibited only slight reductions from September to October. There were negligible changes in sunlight. A sudden shift to cooler temperatures on September 25 tracked well with the downward shift

in isoprene and ozone bias. Therefore, excessive biogenic emissions were considered a possible cause for the September over predictions.

- *Is the depth of daytime vertical diffusion too shallow in September?* We compared modeled mixing depths against 6 PM Shreveport rawinsonde temperature profiles. Relatively large day-to-day variations in mixing depth occurred in both the observations and the model, but the model tended to grossly track observed variability with no consistent high or low bias. Therefore, results were inconclusive. However, since this was a single point comparison per day, we could not extend results to entire State.

An intermediate simulation (Run 10) was performed over the entire September-October modeling period by combining several of the most significant changes listed in Table 6-1. Specifically, the run included:

- CB05 chemical mechanism: emissions for a certain few VOC compounds specific to CB6 were aggregated into CB05 compounds and the TUV preprocessor was run to calculate photolysis rates specific to CB05;
- No nocturnal Kv "patch": enhanced urban vertical mixing at night was removed, but the daytime patch was retained to maximize vertical diffusion;
- Revised wildfire NOy emissions per Run 9, following the approach of Alvarado et al. (2010): Reduced NOx by 80% to align NOx:CO ratios, and added new emissions of PAN (94% of final NOx) and $HNO_3$ (50% of final NOx) to align NOx:NOy ratios and to emulate rapid oxidation of NOx during plume rise and prior to release into the grid.

Figure 6-15 presents spatial plots of MDA8 ozone from Run 10 on September 14, along with the difference in MDA8 from Run 1. This particular day was chosen because it possessed the highest observed ozone of the period in Baton Rouge and exhibited the largest over predictions in Run 1. Dramatic reductions of MDA8 ozone by 10-20+ ppb are evident throughout the domain, but concentrations in Baton Rouge continued to be over predicted by 10-20 ppb on this day. The peak MDA8 continued to be predicted in the fire plume northwest of Baton Rouge, but that peak was reduced by 44 ppb (from 190 ppb).

Figures 6-16 through 6-19 show September and October bias and gross error goal plots for Baton Rouge, New Orleans, Shreveport, and Lake Charles, respectively. Daily bias and gross error were reduced substantially in all four regions and on all days of September, and October daily performance met performance goals on nearly every day. However, the majority of exceedance days in September continued to exhibit high ozone bias in all regions except Shreveport.

## 6.4 Evaluation of Ozone Precursors

Despite rather good October performance achieved in Run 10, the continued large over prediction tendencies in most areas of Louisiana during September indicated that a fundamental systematic problem remained that influenced September more than October. This further gave rise to concerns as to whether good October performance was achieved for

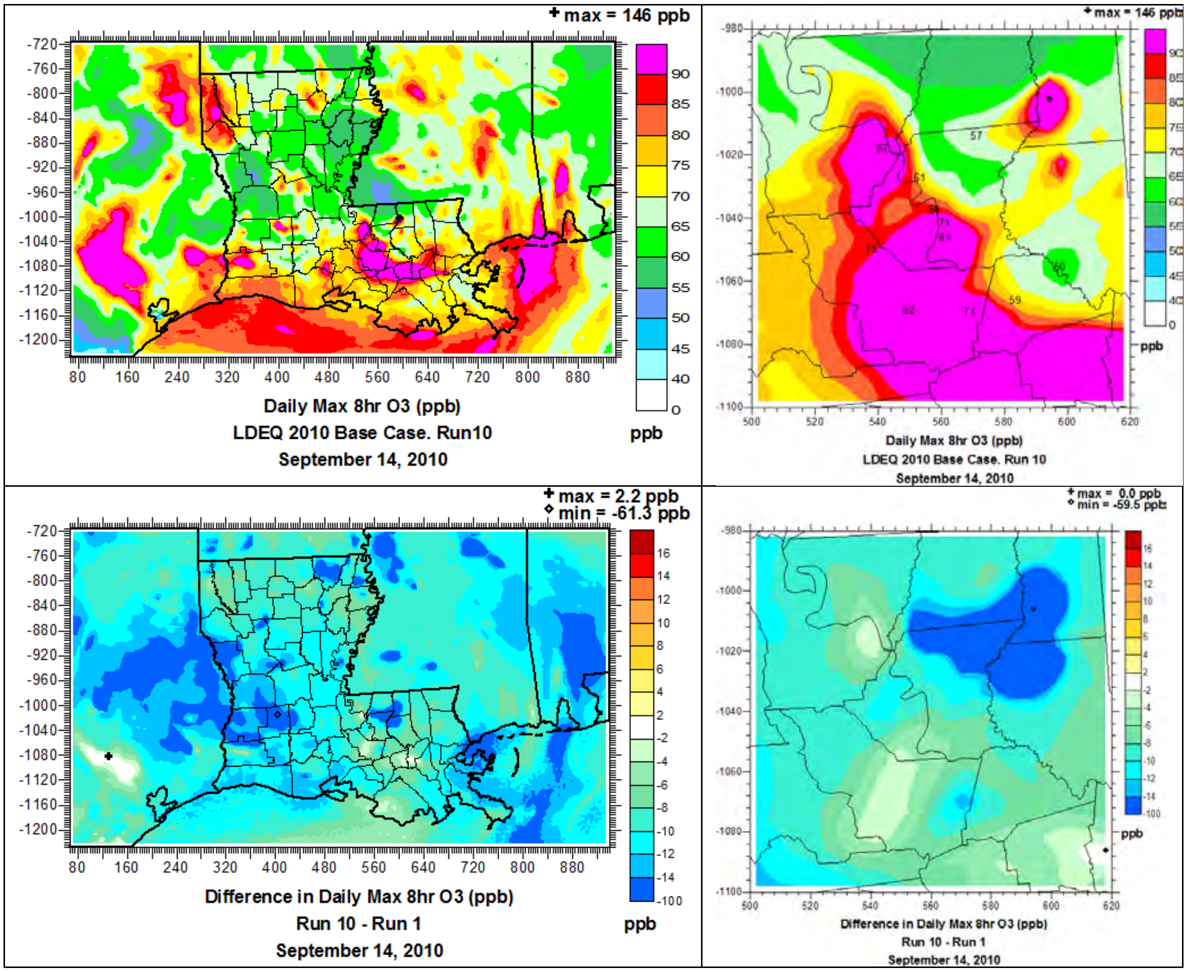



**Figure 6-15. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 10 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 10 – Run 1) in MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right).**

the correct reason(s).

We hypothesized that higher NOx estimated by MOVES could be driving the over predictions. However, results from the MOBILE6 emulation test (Run 8) resulted in minor impacts on simulated urban ozone, despite 30% reductions in NOx. Such insensitivity to NOx is common in NOx-rich urban areas where on-road emissions dominate. But the question remained: should Baton Rouge be more NOx-sensitive?

Analyses comparing simulated and observed NOx, VOC, and VOC:NOx ratios were undertaken to evaluate the emissions inventory for Baton Rouge and to better understand the chemical conditions leading to high ozone in the region. Four PAMS sites are located in Baton Rouge, co-

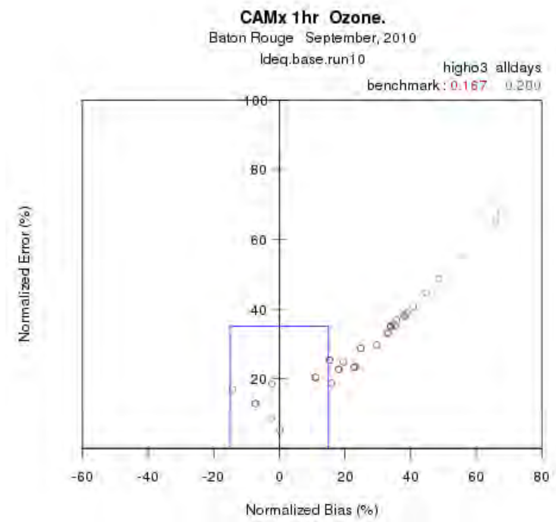
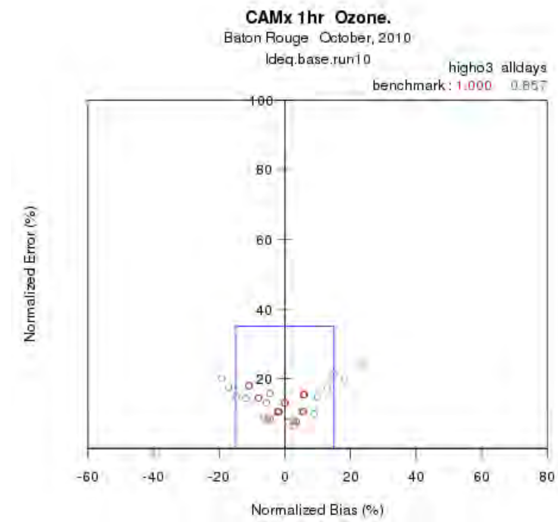
| September | October |
|---|---|
|  |  |





**Figure 6-16. "Goal" plots of daily normalized bias and error from Run 10 in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

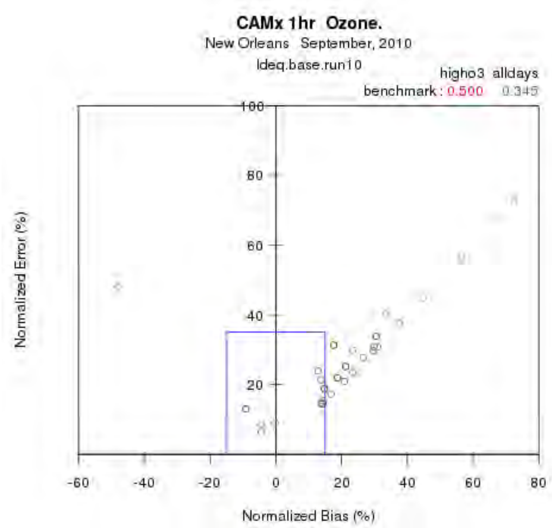
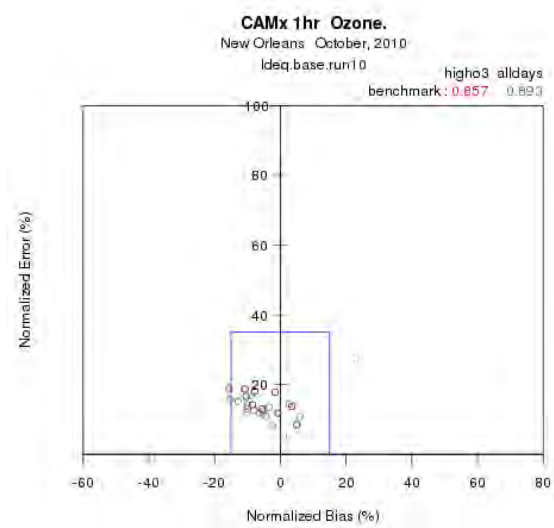
| September | October |
|---|---|
|  |  |





**Figure 6-17. "Goal" plots of daily normalized bias and error from Run 10 in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

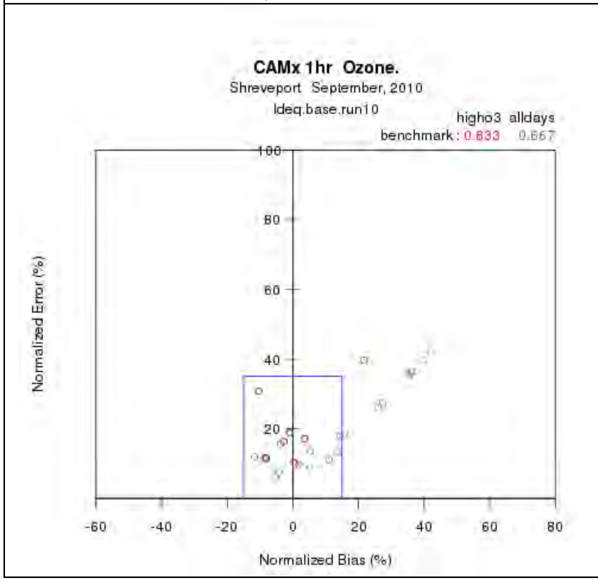
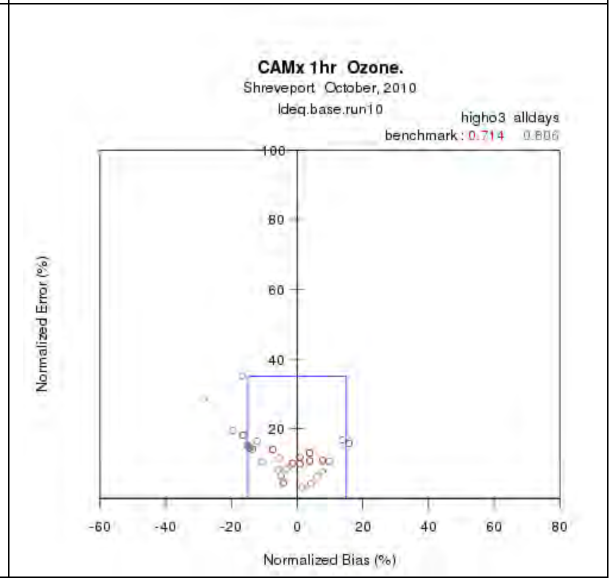
| September | October |
| --- | --- |
|  |  |





**Figure 6-18. "Goal" plots of daily normalized bias and error from Run 10 in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

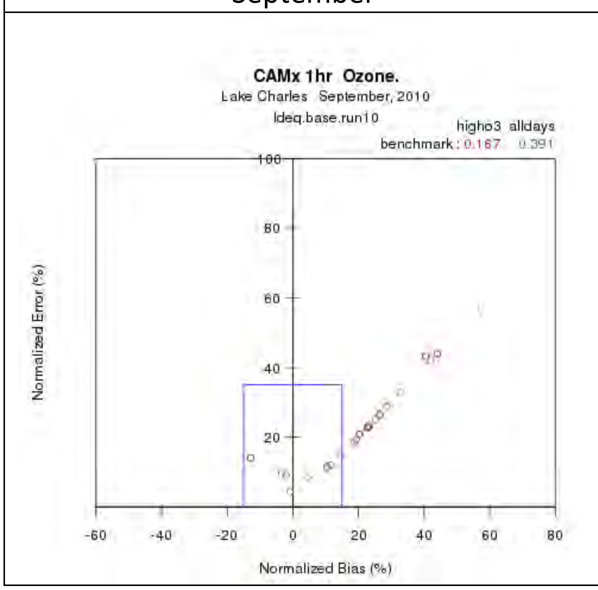
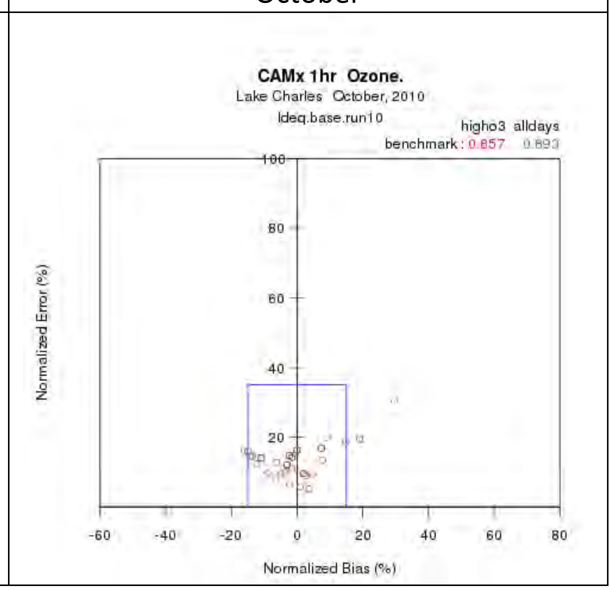
| September | October |
| --- | --- |
|  |  |





**Figure 6-19. "Goal" plots of daily normalized bias and error from Run 10 in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

located with AQS sites measuring hourly ozone and NOx (Figure 6-20). The PAMS sites take 3-hour canister samples of ambient air every few days, which are then analyzed for 55 individual hydrocarbon species.

Morning average (6-9 AM) CB05 VOC predictions from Run 10 were compared to PAMS measurement data (aggregated to CB05 compounds) for all available days of the September-October 2010 modeling period. This was done to evaluate fresh VOC emissions associated with the morning commute hours before significant chemistry and mixing impacted the measurements and simulation. Both the absolute concentrations on a species-by-species basis, and the relative distribution among all CB05 species were evaluated as a check of the emissions inventory speciation profiles. VOC:NOx ratios were generated for the same periods to evaluate daily ozone-forming potential and to assess precursor performance and potential issues with the local emissions inventory.

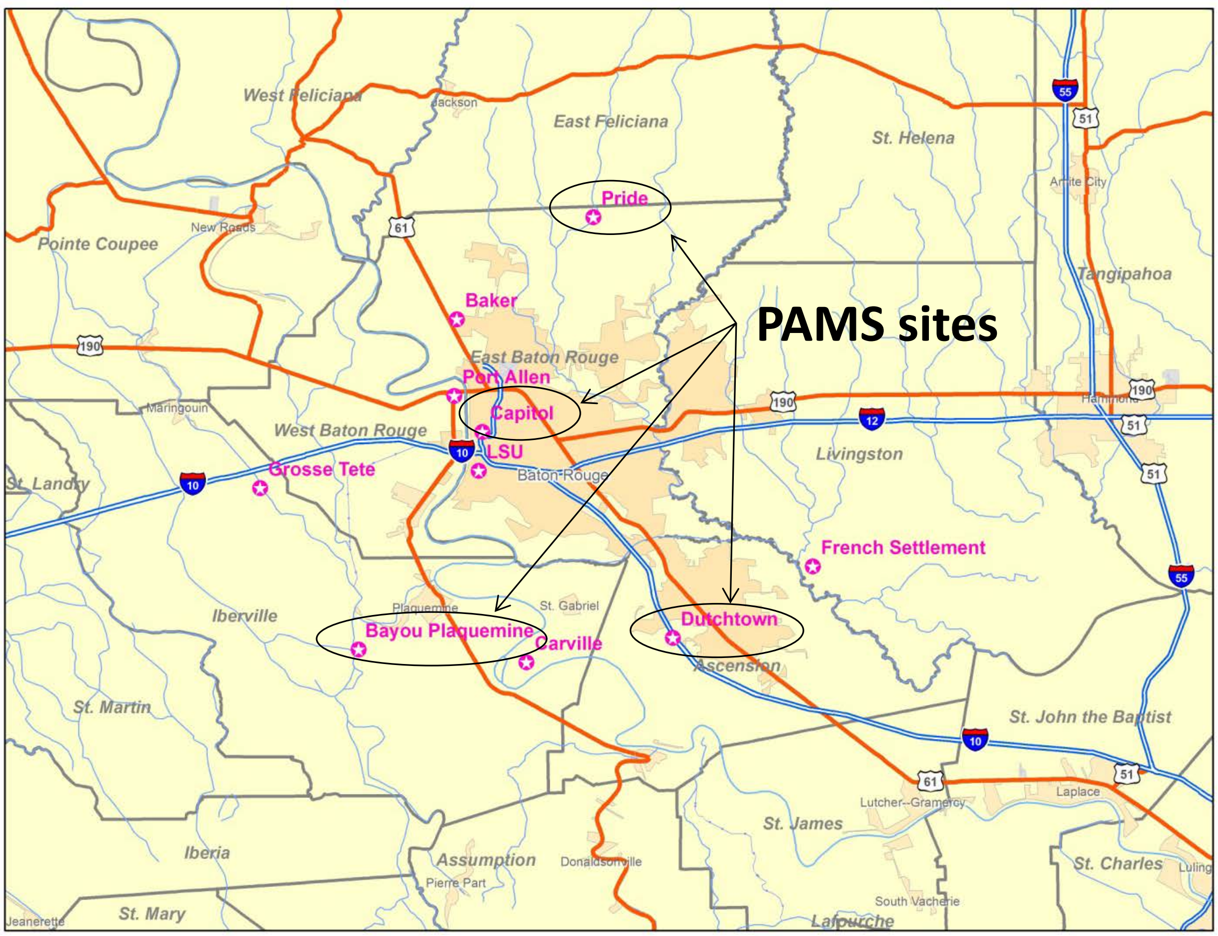



**Figure 6-20. Location of AQS monitoring sites in the Baton Rouge area (stars). Highlighted are four co-located PAMS sites measuring 3-hour VOC samples every few days.**

General precursor comparisons at all four PAMS sites are summarized in Table 6-2, expressed as 6-9 AM averages over September and October. At the urban sites (Capitol and Dutchtown), both NOx and VOC tend to be over predicted, but VOC:NOx ratios are adequately predicted and indicate NOx-rich, VOC-limited conditions. Precursor over predictions may be associated with inadequate morning ventilation in the growing mixed layer, and/or too much emission allocated to the 6-9 AM period. At the rural sites (Pride and Bayou Plaquemine), NOx is well-predicted, but VOC is over predicted and that leads to higher simulated VOC:NOx ratios than observed, particularly at Pride (NOx-sensitive conditions).

**Table 6-2. September and October averages of 6-9 AM observed and simulated NOx, VOC, and VOC:NOx ratio at four PAMS sites in Baton Rouge. VOC:NOx ratios are colored according to VOC-limited (blue), NOx-limited (red), and transition (purple) conditions.**

| | Capitol | | Dutchtown | | Pride | | B. Plaquemine | |
|---|---|---|---|---|---|---|---|---|
| | Sep | Oct | Sep | Oct | Sep | Oct | Sep | Oct |
| Obs NOx (ppb) | 21 | 36 | 14 | 23 | 6 | 7 | 13 | 14 |
| Prd NOx (ppb) | 29 | 37 | 21 | 26 | 3 | 4 | 16 | 12 |
| Obs VOC (ppbC) | 104 | 214 | 59 | 72 | 24 | 30 | 70 | 72 |
| Prd VOC (ppbC) | 188 | 184 | 150 | 172 | 66 | 66 | 104 | 88 |
| Obs VOC:NOx | 5 | 6 | 4 | 3 | 4 | 5 | 5 | 5 |
| Prd VOC:NOx | 6 | 5 | 7 | 7 | 23 | 15 | 6 | 8 |

Figure 6-21 shows absolute comparisons of 6-9 AM CB05 VOC concentrations at all four sites as an example of a poor performing high ozone day (September 14); relative distributions are shown in Figure 6-22. Figure 6-21 also includes annotations indicating 6-9 AM NOx comparisons and VOC:NOx ratios on that day. All sites exhibit over predictions of VOC, especially isoprene at rural sites. At all sites except Pride, simulated NOx is close to measurements, and this leads to VOC:NOx ratios that are too high into the transitioning from VOC-sensitive to NOx-sensitive. At Pride, the excessive isoprene is driving VOC:NOx ratios far too high. Whereas NOx should be inhibiting ozone formation at these sites, both NOx and VOC are likely contributing to ozone formation and that could explain ozone over predictions on this day.

Plotting these distributions as relative contributions to total VOC indicates the extent to which emissions are speciated correctly (Figure 6-22). On September 14, the relative distributions of CB05 species are well-replicated except for the consistent under prediction of ethane. Ethane is not well characterized in emission inventories, and its presence at measured values shown in Figure 6-21 suggest regional contributions from natural gas sources (production, distribution, processing). While this suggests a missing component in the emission inventory, ethane reacts very slowly and thus has little impact on local ozone generation.

Figures 6-23 and 6-24 show the absolute and relative VOC concentrations as an example of a good performing high ozone day (October 23), but are otherwise identical to the plots for September 14. Again VOCs tend to be over predicted but so is NOx at all sites except Pride, leading to excellent agreement in VOC:NOx ratios at three of the four sites. Note the

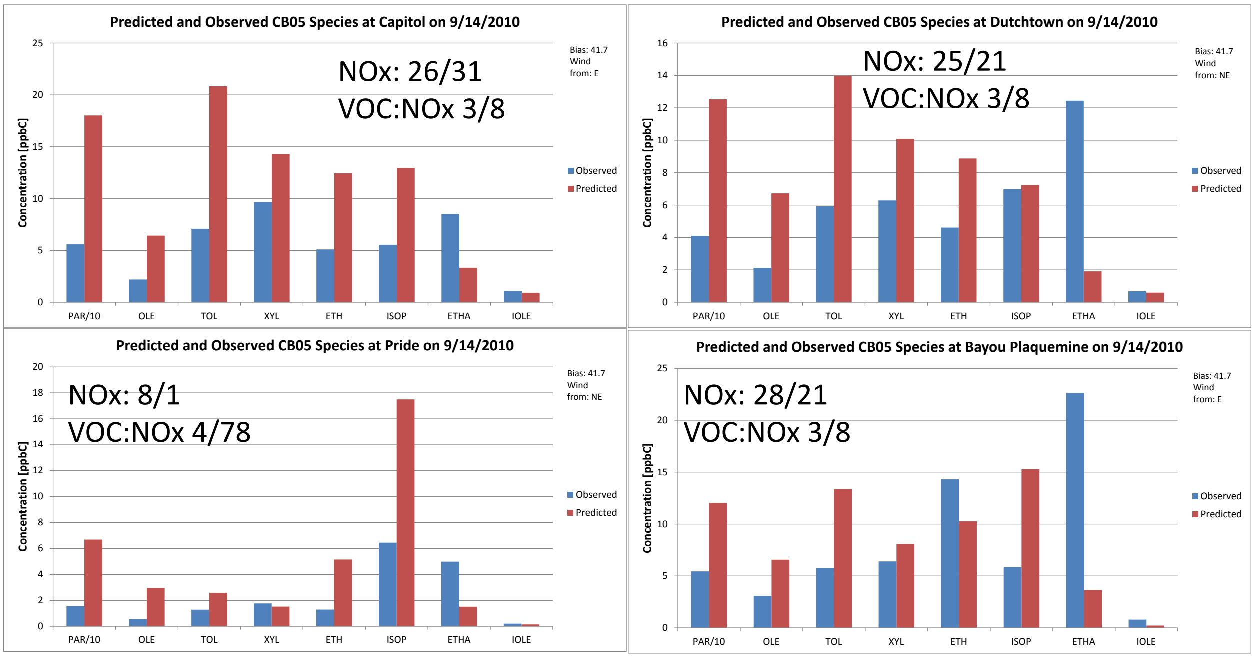



**Figure 6-21. Comparison of 6-9 AM observed (blue) and simulated (red) CB05 VOCs at four PAMS sites in Baton Rouge on September 14, 2010. Plots are annotated with 6-9 AM observed/predicted NOx and VOC:NOx ratio.**

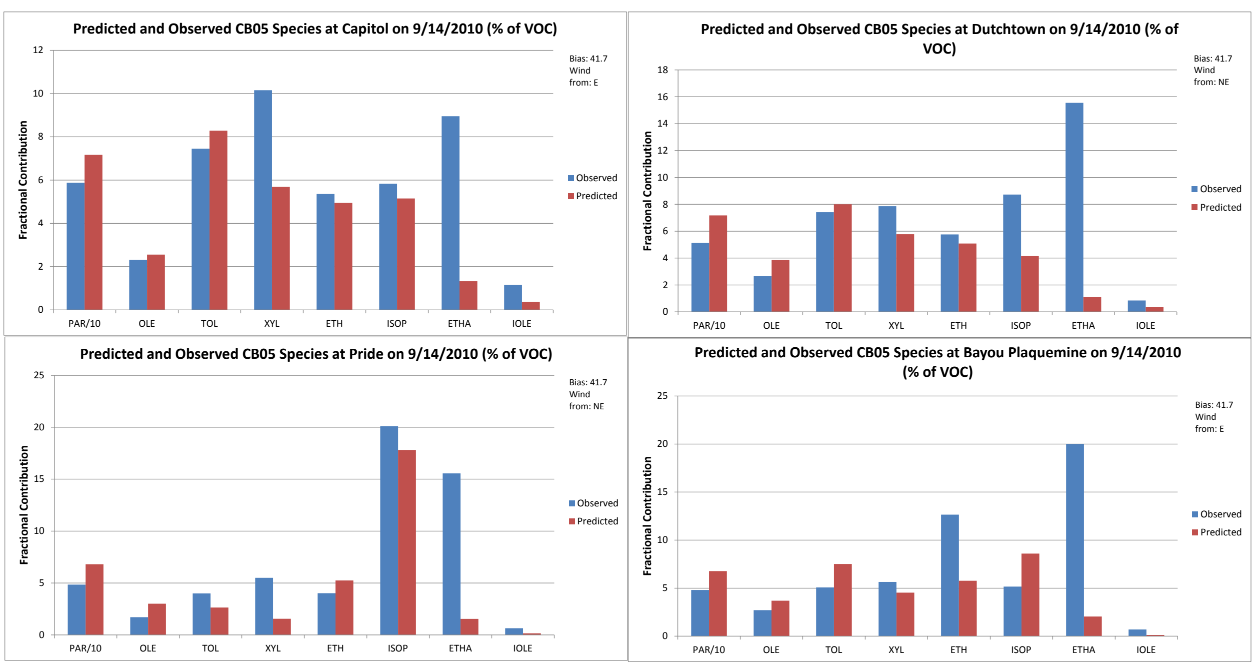



**Figure 6-22. Comparison of 6-9 AM observed (blue) and simulated (red) relative contributions of CB05 VOCs to total VOC at four PAMS sites in Baton Rouge on September 14, 2010.**

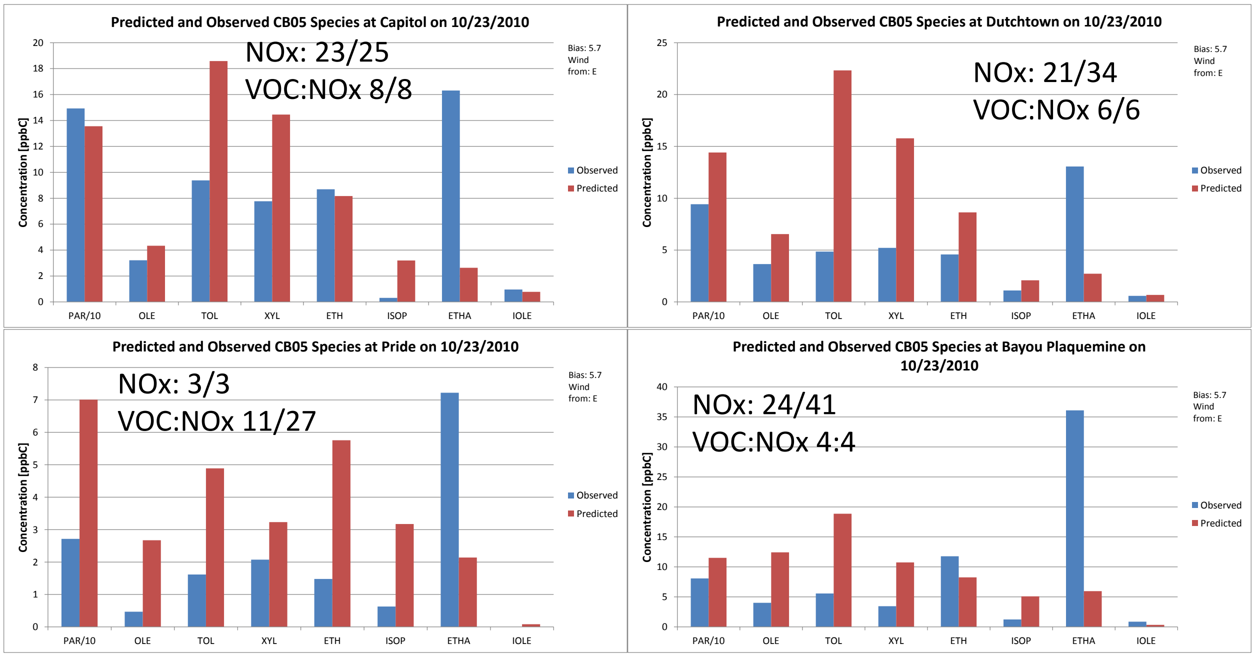



**Figure 6-23. Comparison of 6-9 AM observed (blue) and simulated (red) CB05 VOCs at four PAMS sites in Baton Rouge on October 23, 2010. Plots are annotated with 6-9 AM observed/predicted NOx and VOC:NOx ratio.**

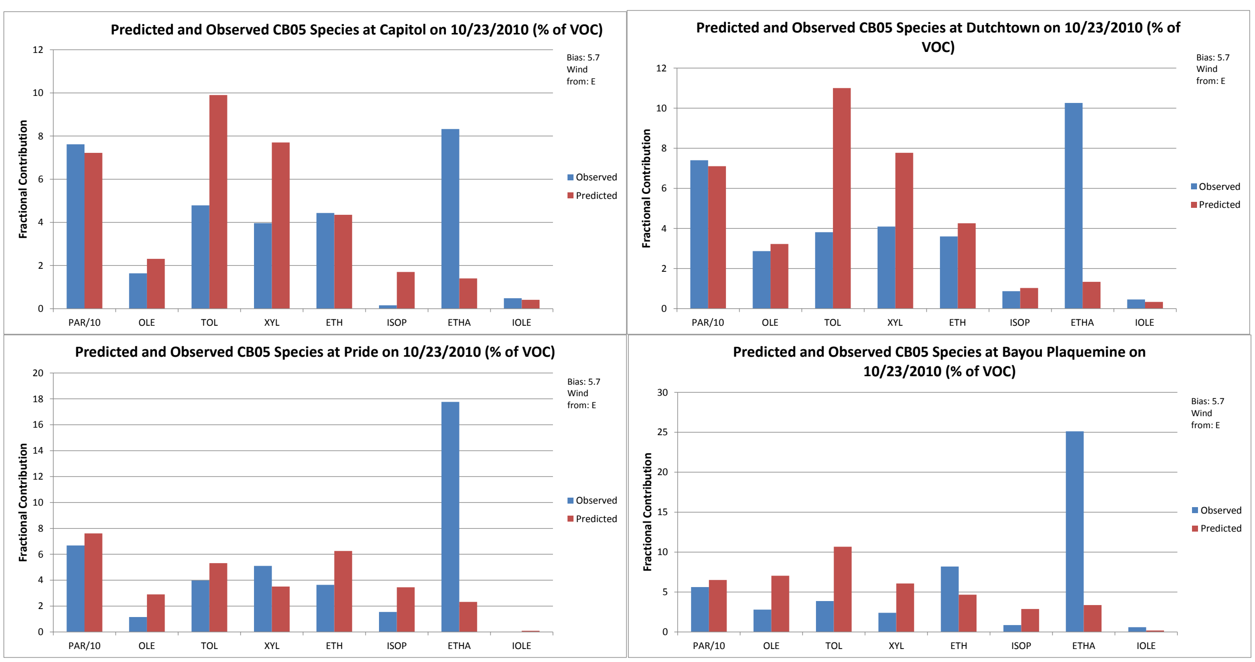



**Figure 6-24. Comparison of 6-9 AM observed (blue) and simulated (red) relative contributions of CB05 VOCs to total VOC at four PAMS sites in Baton Rouge on October 23, 2010.**

dramatically lower isoprene contributions at all sites. The relative plots show good agreement in the VOC distributions, except the urban sites exhibit larger proportions of aromatics (toluene and xylene), which suggest contributions from gasoline sources. Again, the ethane contribution is dominant at all four sites.

In summary, VOC:NOx ratios were replicated well at 3 of the 4 Baton Rouge PAMS sites over the entire modeling period. Both NOx and VOC tended to be equivalently too high. Generally, primary precursor emissions should be under predicted in grid models because of instantaneous dilution into large grid volumes. Over predictions in both NOx and VOC may be caused by too little vertical mixing during the morning hours, or an incorrect proportion of emissions allocated to that period of the day.

Based on VOC:NOx ratios, morning NOx and VOC emissions appear to be in the correct proportion. Furthermore, speciated (CB05) VOC emissions are correctly proportioned relative to total VOC except for isoprene and ethane. Simulated VOC:NOx ratios were too high on September days when ozone was grossly over predicted, and over estimates of isoprene were found to be a significant contributor to this. VOC:NOx ratios were in excellent agreement on good performing October days, when isoprene was much lower. Ethane appears to be largely missing in the emissions inventory, but this should be a negligible contributor to local ozone formation. PAMS measurements also showed occasionally large spikes in two additional compounds: light alkanes (PAR), which are usually associated with fugitive or evaporative sources; and ethylene, which is a highly reactive VOC released from petrochemical facilities.

With respect to the issue of higher NOx generated by MOVES, these analyses do not support the hypothesis that the on-road NOx inventory is driving ozone over predictions. The simple MOBILE6 test that reduced NOx and increased VOC should have raised VOC:NOx ratios, thereby misaligning from observed conditions and pushing the urban photochemical environment toward a more NOx-sensitive regime.

## 6.5 Additional Sensitivity Testing (Phase 2)

Based on new information gleaned from the precursor assessment described above, an additional series of diagnostic sensitivity tests were conducted for the high ozone period of September 10-25. Table 6-3 summarizes each of the Phase 2 sensitivity tests, including their purpose and their results. All tests were performed based on the Run 10 configuration.

A biogenic reduction test (Run 11) investigated the ozone impact from a 50% isoprene emission reduction. The choice of this factor was based on analyses of predicted and measured midday isoprene concentrations at PAMS sites during the September-October modeling period. Figure 6-25 shows and example at the Capitol site, where isoprene measurements were over predicted by an average factor of 2.5 throughout the period. Subsequent comparisons between MEGAN-derived isoprene emissions over the entire 4-km grid and estimates from the EPA's BEIS model also show differences by similar factors for August and September, and much smaller differences in October (Figure 6-26).

**Table 6-3. Phase 2 diagnostic sensitivity tests performed on the CAMx 2010 base year simulation.**

| Run ID | Purpose | Results |
|---|---|---|
| 11 | Reduce biogenic isoprene by 50% according to PAMS measurements | Large widespread reductions in MDA8 ozone; Improved statistical performance |
| 12 | Increase haze turbidity by a factor of 5 to investigate impact to photolysis rates from heavy fire-derived aerosol burdens | Negligible impacts to statistical performance; Negligible impacts on MDA8 patterns; |
| 13 | Calculate Kv from ACM2 technique to test sensitivity to increased mixing (no changes to mixing depth) | Minor mixed impacts to statistical performance; Minor mixed impacts on MDA8 patterns |
| 15 | Replace Zhang03 dry deposition with Wesely89 to test sensitivity to choice of algorithm; gridded landuse derived from WRF | Large widespread reductions in MDA8 ozone; Improved statistical performance |
| 16 | Scale mixing depth upward by 25%, consistent with remaining average September over prediction bias, to test sensitivity to deeper mixing (no changes to Kv methodology) | Mixed impacts to statistical performance; Moderate mixed impacts on MDA8 patterns |

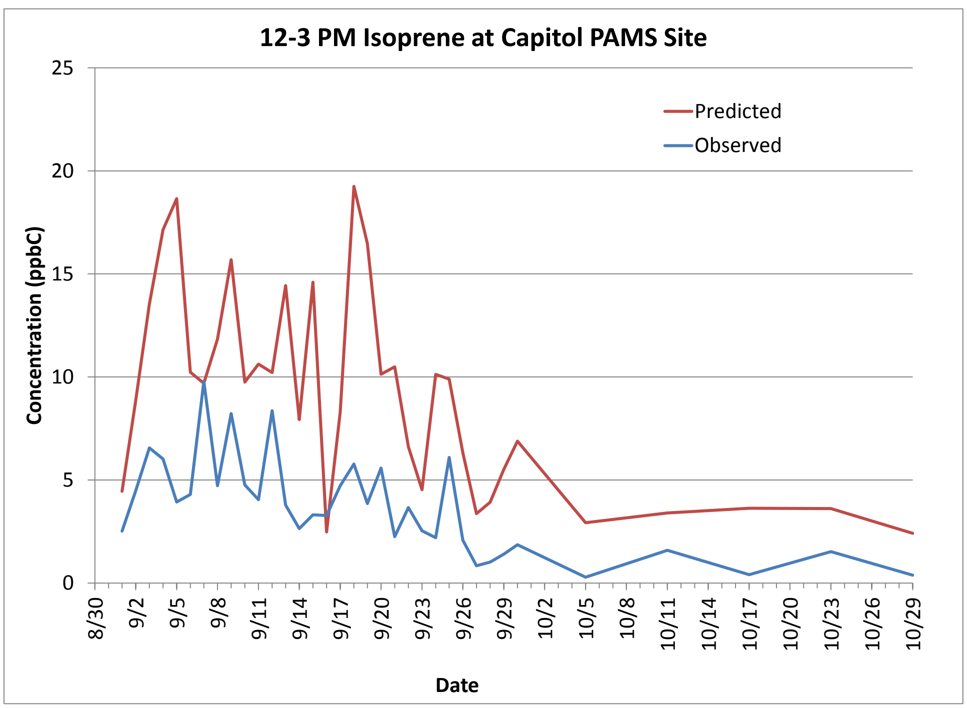



**Figure 6-25. Midday (12-3 PM) observed and predicted (Run 10) isoprene concentrations at the Capitol PAMS site on sampling days throughout September and October 2010.**

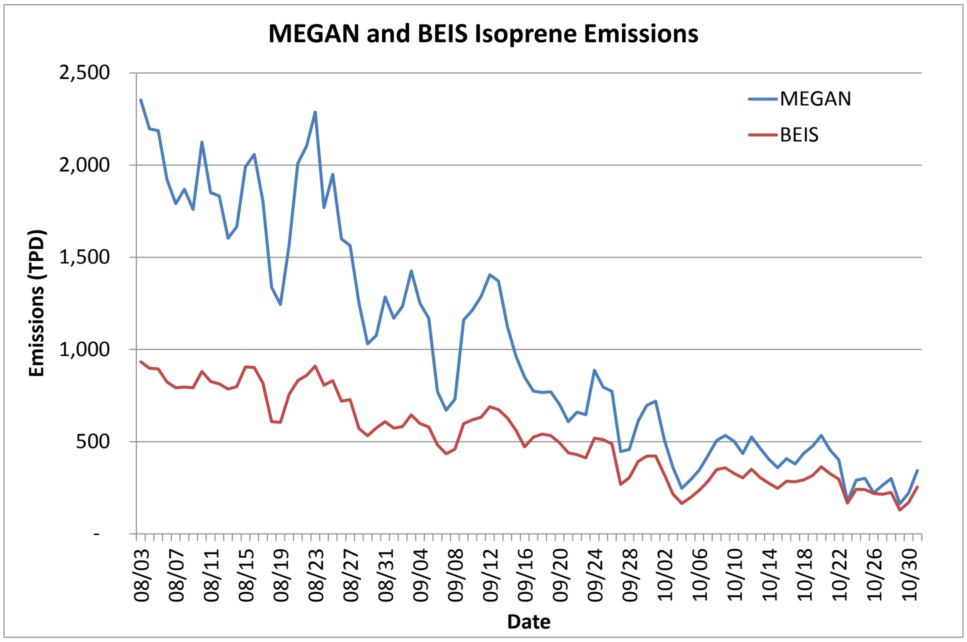



**Figure 6-26. Daily total isoprene emissions across the entire 4 km modeling grid estimated by MEGAN and BEIS for each day of August through October 2010.**

Figure 6-27 presents spatial plots of MDA8 ozone from Run 11 on September 14, along with the difference in MDA8 from Run 10. Results show much lower ozone in NOx-heavy, VOC-sensitive areas (i.e., urban). Widespread ozone reductions of 5-10 ppb were common throughout southern and northwestern where NOx emissions were highest. This strengthens evidence that over estimated biogenic emissions drive ozone over predictions, especially in September.

Two additional vertical mixing tests were conducted: the first employed an alternative Kv calculation methodology (ACM2) that consistently leads to much higher mixing rates than any other option available in the WRFCAMx pre-processor (Run 13); the second increased the depth of mixing by 25% (Run 16). The first test was designed to test if insufficient mixing rates within the same mixing depth were leading to ozone over predictions. Minor positive and negative ozone changes occurred (< ±5 ppb), scattered throughout the domain. The second test attempted to apply an ad-hoc increase to daily mixing volumes by a factor consistent with the September over prediction bias, thereby reducing the bias toward zero. Larger mixed signals were generated in this test, but impacts to statistical performance were not significant. These two tests show that ozone patterns did not respond linearly to modified vertical mixing rates or depths. Together with the original Phase 1 test using mixing rates calculated using the YSU option (Run 6), it is clear that the September over predictions were not driven by uncertainties in boundary layer mixing.

An alternative dry deposition algorithm, referred to as WESELY89, was employed in Run 15 to test sensitivity to pollutant removal to the surface. The WESELY89 option is the original scheme in CAMx, and it requires a different landuse classification scheme based on 11 types (as

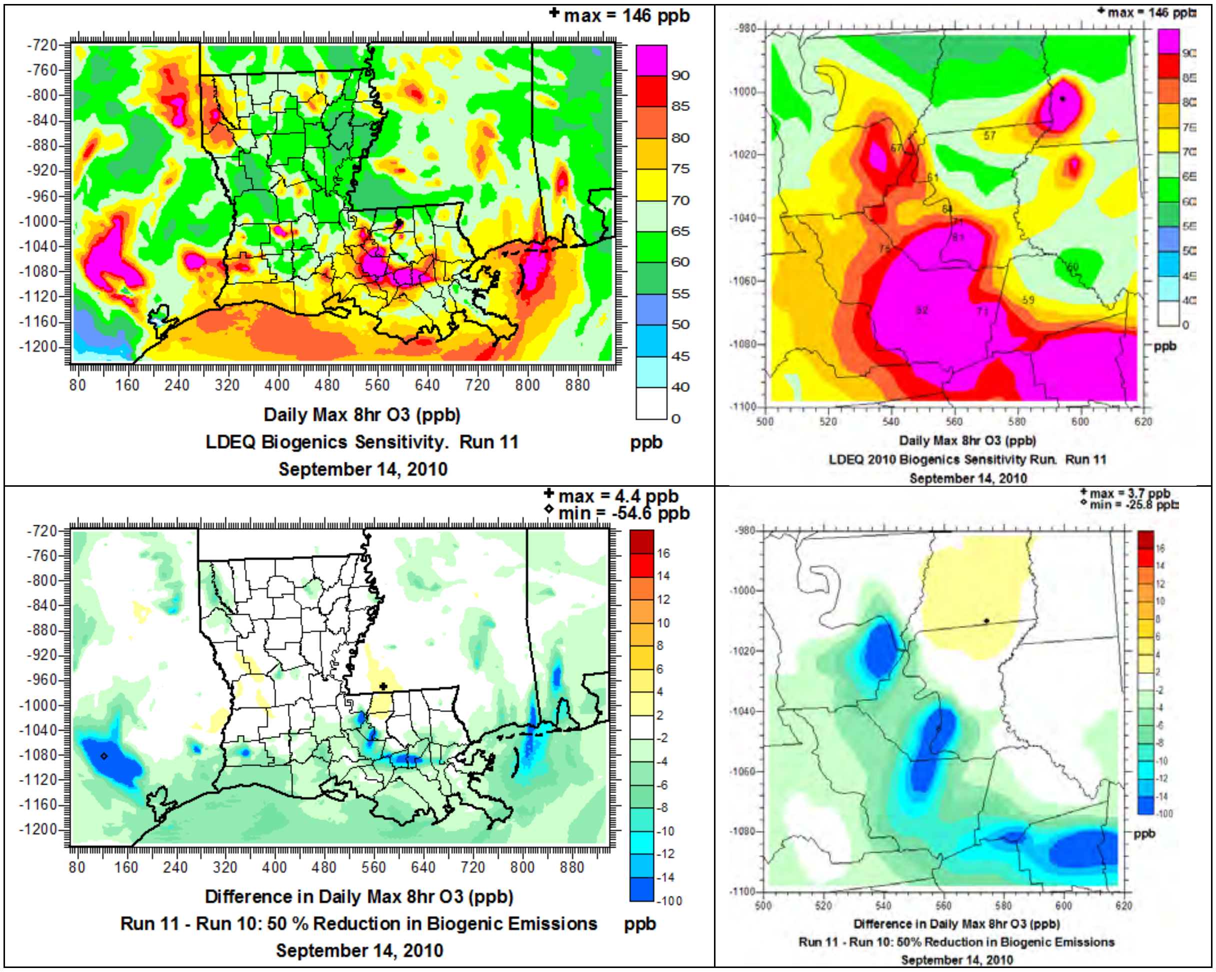



**Figure 6-27. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 11 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 11 – Run 10) in MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right).**

opposed to 26 types in ZHANG03). Alternative gridded landuse input fields were derived from WRF output, which reports the dominant landuse type in each grid cell using a 26-category USGS classification scheme. The WRF landuse types were mapped to the 11 WESELY89 types using the WRFCAMx pre-processor. Run 15 included the 50% biogenic isoprene reduction from Run 11 to carry on that important modification. Relative to Run 11, the alternative deposition option resulted in additional large reductions in MDA8 ozone throughout the September 10-25 test period and significant improvements in statistical model performance in the Baton Rouge area. Figure 6-28 presents spatial plots of MDA8 ozone from Run 15 on September 14, along with the difference in MDA8 from Run 11 (the 50% biogenic test) to isolate the deposition signal. Reductions of MDA8 consistently reached 5-15+ ppb over much of the 4 km modeling

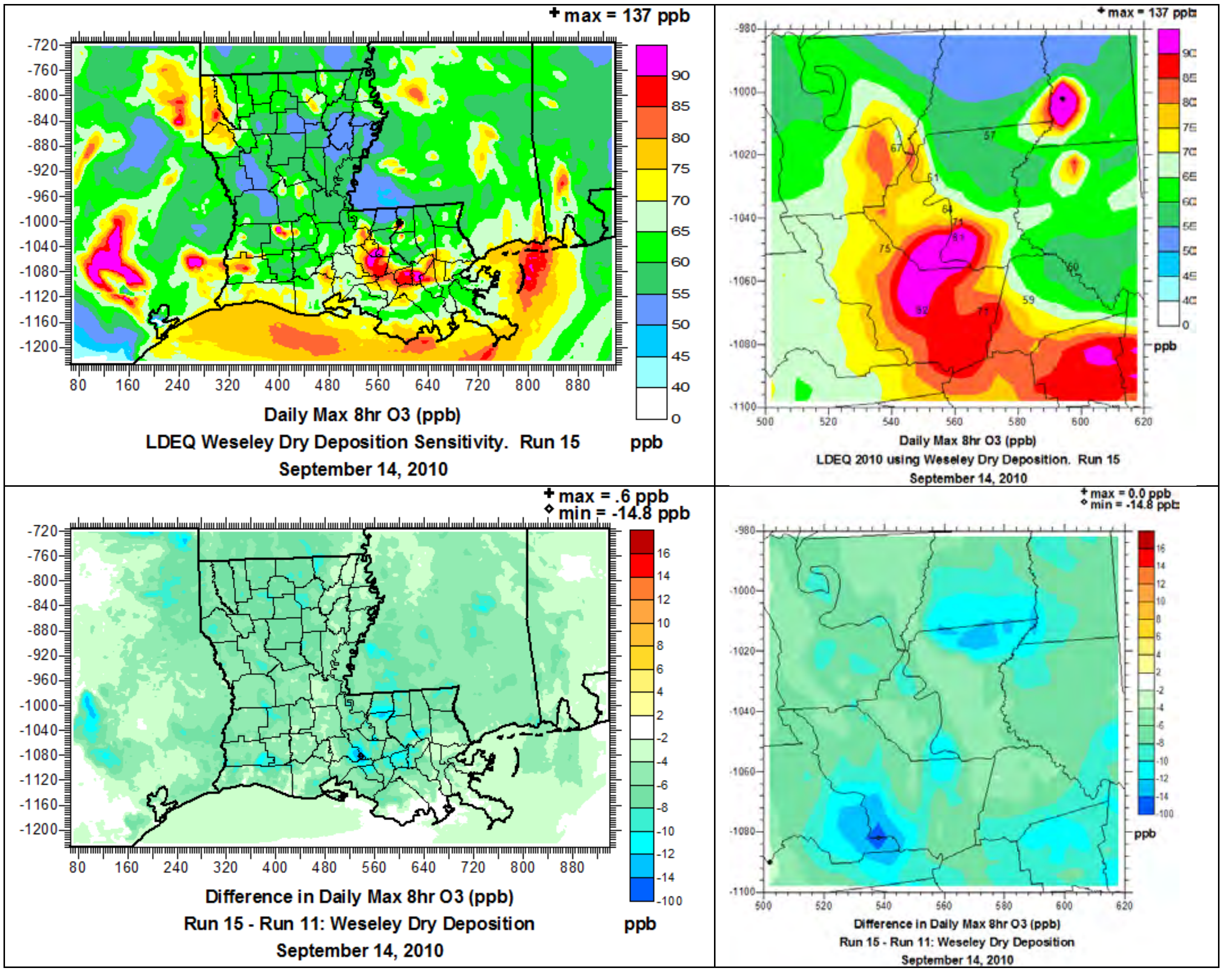



**Figure 6-28. Top row: Spatial distribution of predicted MDA8 ozone (ppb) from Run 15 on September 14. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right). Bottom row: Spatial distribution of differences (Run 15 – Run 11) in MDA8 on the 4 km modeling grid (left) and over south-central Louisiana (right).**

grid. Average model bias for 1-hour ozone in Baton Rouge during September exceedance days was reduced to 6% in Run 15, compared to 13% in Run 11 (reduced biogenics), 23% in Run 10 (Phase 1 interim simulation), and 32% in Run 1.

## 6.6 Final Base Year CAMx Run

The final CAMx base year simulation ("Run 17") incorporated certain modifications from the sensitivity tests that collectively led to improved model performance for ozone. Otherwise, the simulation used identical inputs as in Run 1, and was performed for the entirety of September and October 2010 (including the August 15-31 spinup period). The CAMx configuration for the final base year simulation is listed below (red highlighted items note modifications from Run 1):

- Time zone: Central Standard Time (CST)
- I/O frequency: 1 hour
- Map projection: Lambert conformal (see Section 4.1)
- Nesting: 2-way fully interactive 36/12/4-km computational grids (Figure 4-1)
- Chemistry mechanism: CB05 gas-phase only (without PM)
- Chemistry solver: Euler-Backwards Iterative (EBI)
- Advection solver: Piecewise Parabolic Method (PPM)
- Plume-in-Grid sub-model: Off
- Probing Tools: Off
- Asymmetric Convective Model: On
- Photolysis Adjustments for Clouds: in-line TUV
- Photolysis Adjustment for Aerosols: input AHOMAP
- Dry deposition: Wesely89
- Wet deposition: On
- Biogenic emissions: EPA BEIS
- Wildfires: Reduced NOx, addition of aged NOy
- Kv Patch: No nighttime urban patch

Figure 6-29 presents spatial plots of MDA8 ozone over the 4-km nested grid on days when ozone exceeded the 2008 ozone NAAQS at any location in Louisiana (compare to Figure 6-1). Simulated ozone over predictions were reduced substantially on all of these days. The highest simulated ozone continued to occur on September 14, reaching 137 ppb in a very isolated area to the northeast of Baton Rouge, but the peak value of 57 ppb at Pride was well simulated. Closer to Baton Rouge, predicted ozone exceeded 90 ppb to the south of the city whereas peak observations reached 82 ppb at Bayou Plaquemine.

Another series of high ozone days occurred in the Baton Rouge area on October 8-10, with peak predictions reaching 82 to 89 ppb. However, these maxima occurred in areas well east of any monitoring sites so their magnitude cannot be verified. The model shows much lower ozone in the areas of the Baton Rouge monitors on these days, with concentrations in the 60-80 ppb range, which agrees rather well with measurements.

Time series of daily statistics for Baton Rouge are shown in Figure 6-30 (compare to Figure 6-2). Performance in September continued to be worse than in October, but the large errors prevalent in the initial base year run were dramatically reduced to the benchmarks for a well-performing model, particularly on high ozone days. Figure 6-31 presents the same data as Figure 6-30 but as goal plots; Figures 6-32 through 6-34 show results for New Orleans, Shreveport, and Lake Charles (compare to Figures 6-3 through 6-6). In all areas, performance on September high ozone days improved to within the statistical benchmarks. Performance in October shifted toward a slight under prediction tendency in most areas.

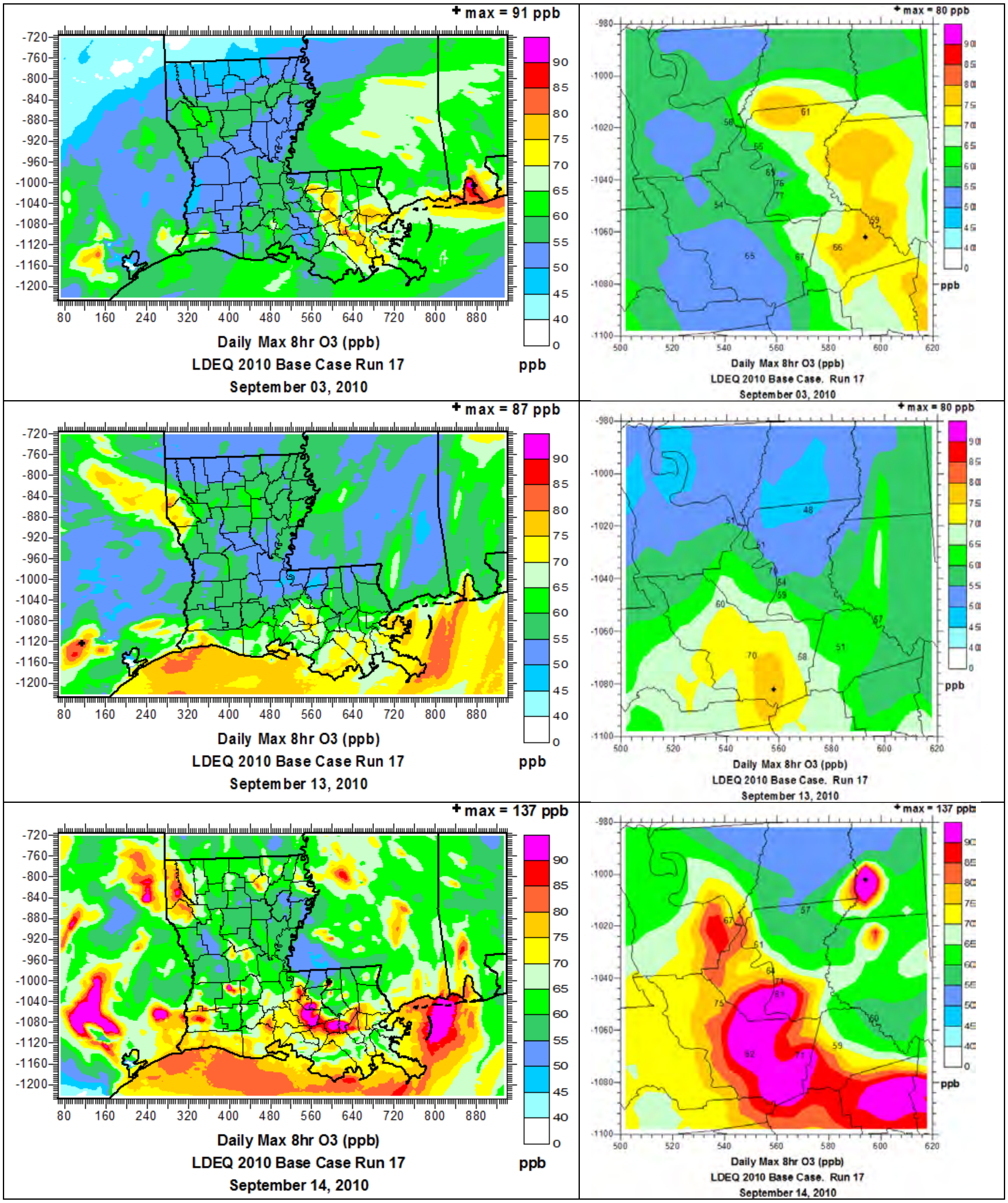



**Figure 6-29. Spatial distribution of predicted MDA8 ozone (ppb) from the final base year run on days exceeding the 2008 ozone NAAQS in Louisiana. Plots are shown for the entire 4 km modeling grid (left) and for south-central Louisiana focusing on Baton Rouge, with observed MDA8 ozone overlaid at monitor locations (right).**

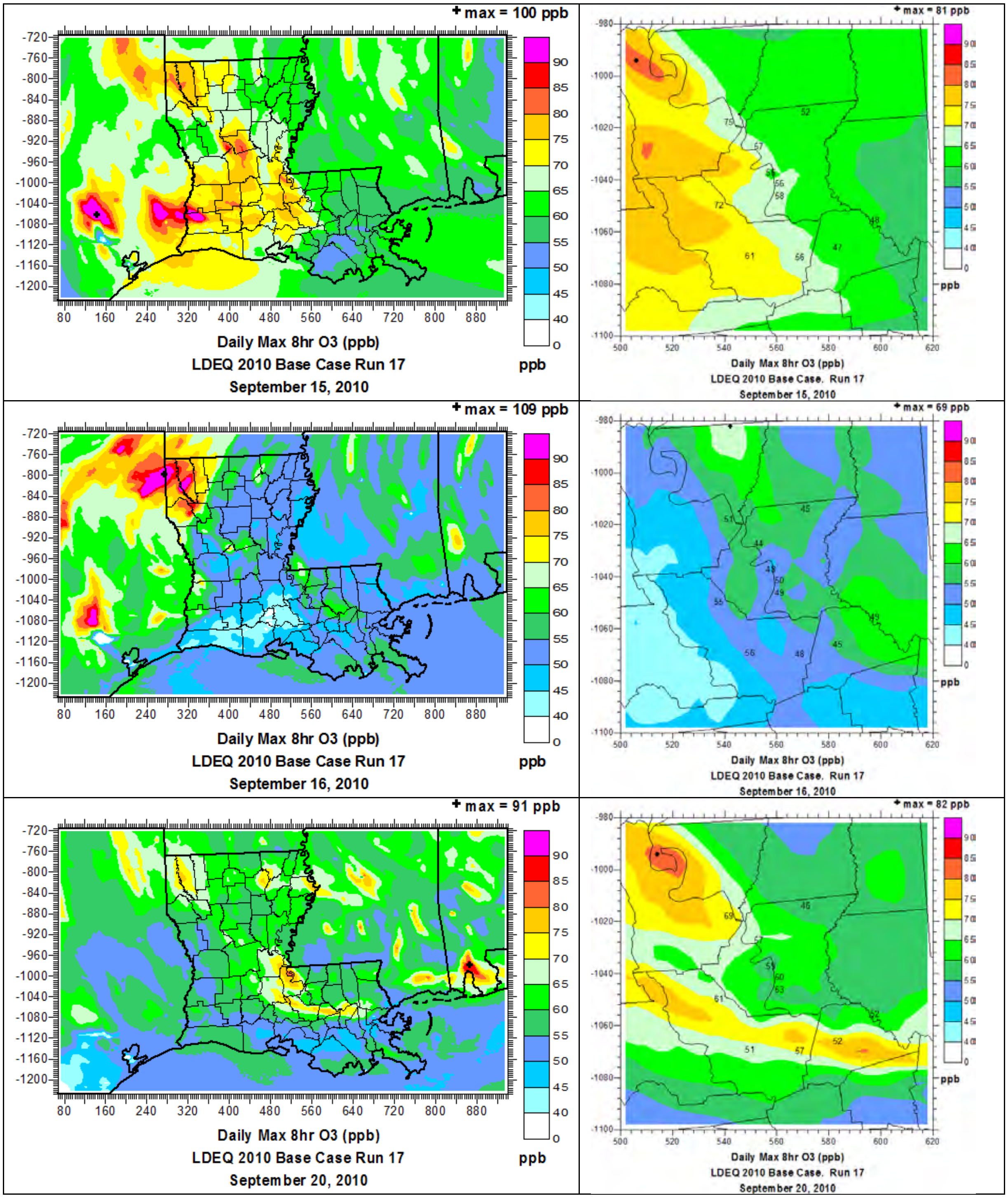



**Figure 6-29 (continued).**

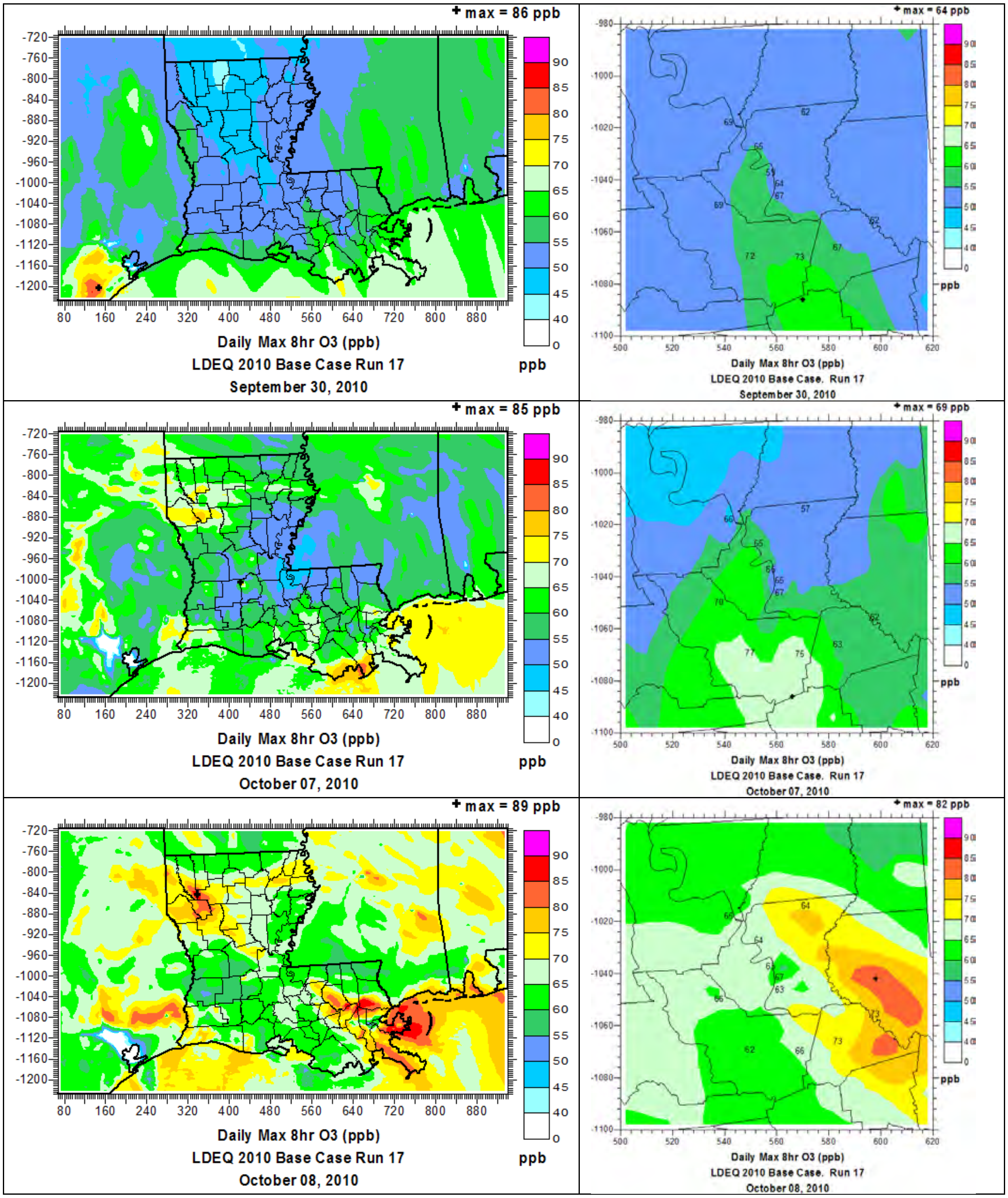



**Figure 6-29 (continued).**

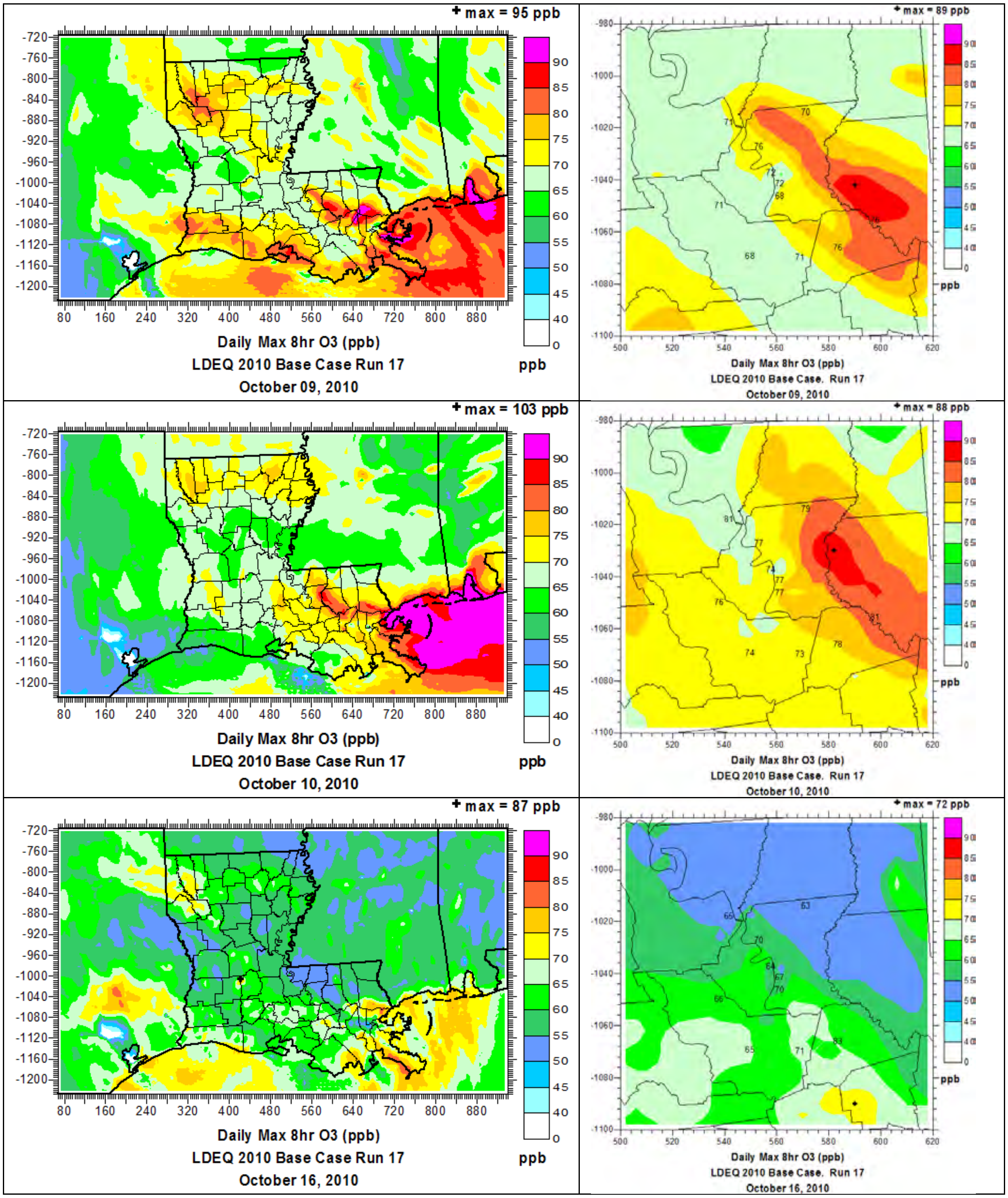



**Figure 6-29 (continued).**

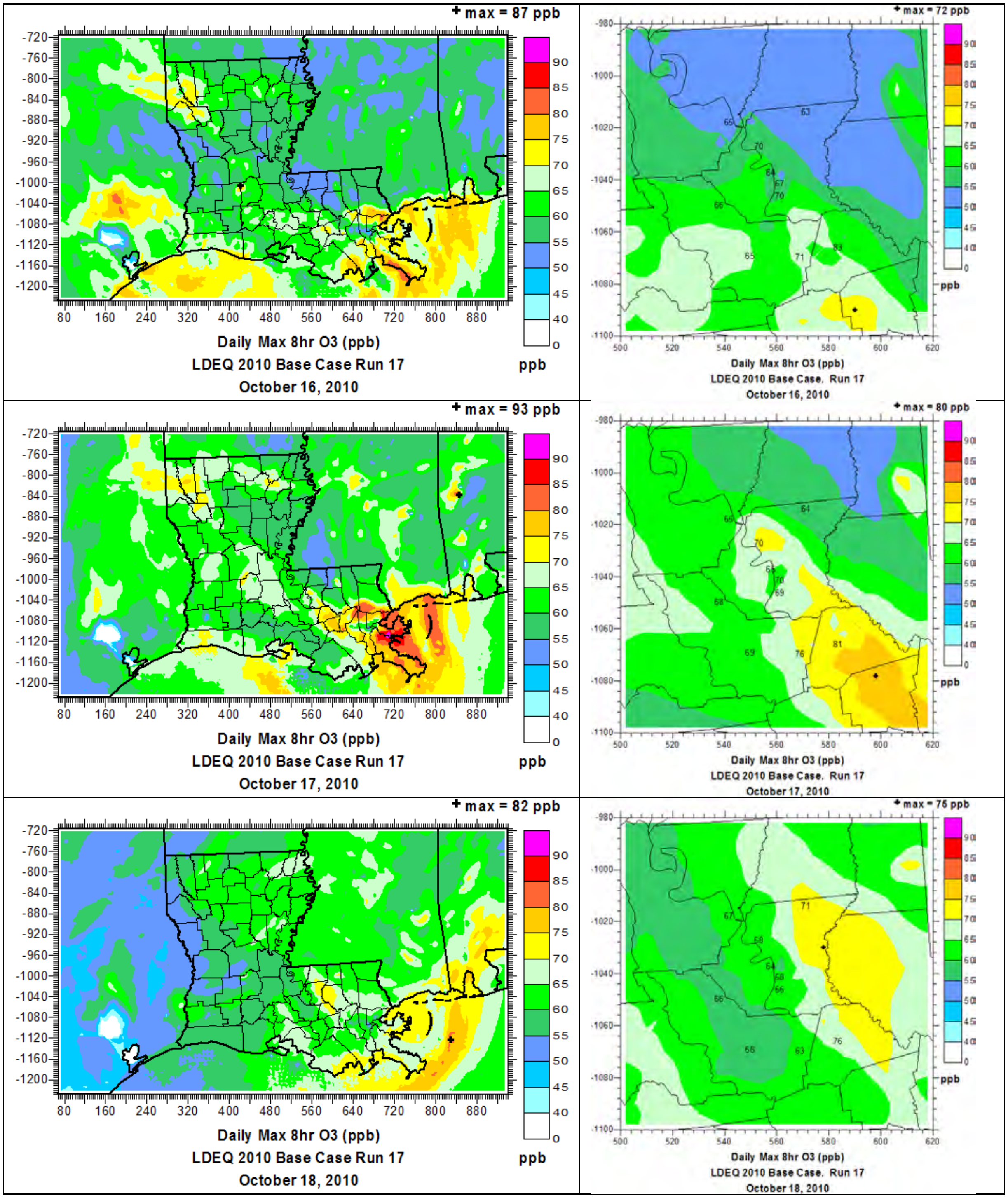



**Figure 6-29 (concluded).**

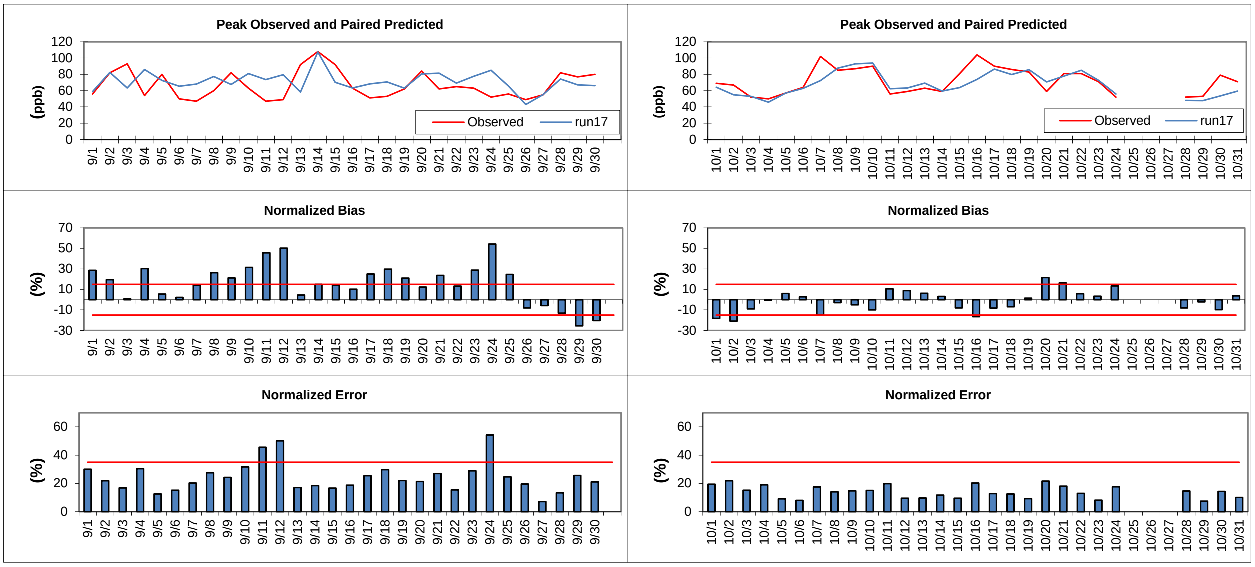



**Figure 6-30. Daily statistical performance for the final base year run at all Baton Rouge monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: maximum daily peak 1-hour observed ozone (red) and paired simulated peak at the same site (blue). Middle row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines).**

| September | October |
|---|---|

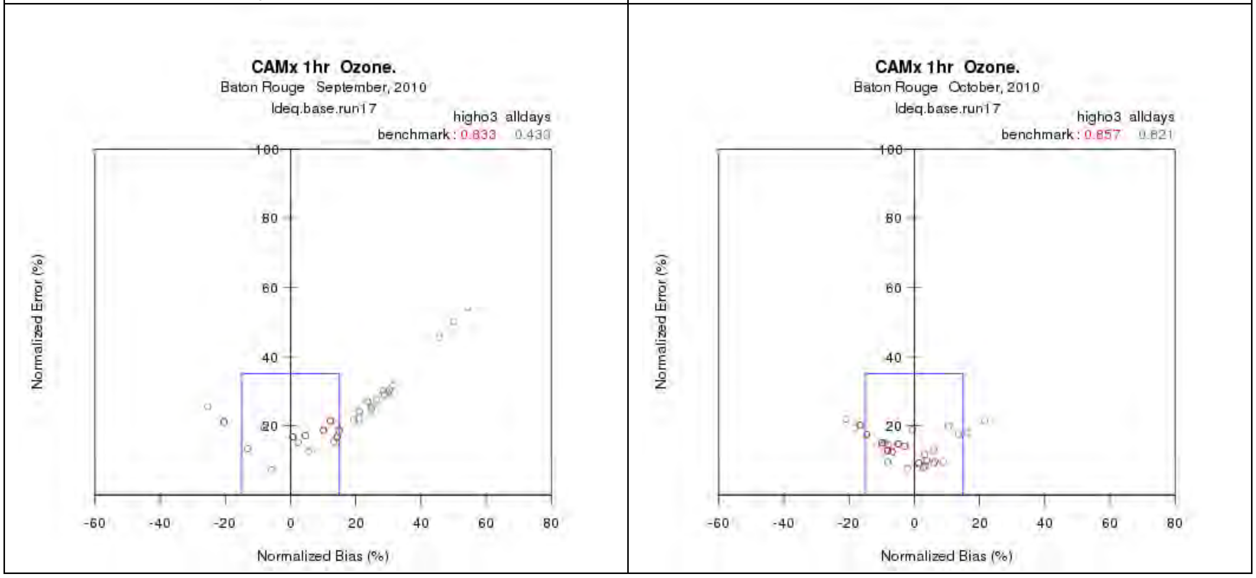



**Figure 6-31. "Goal" plots of daily normalized bias and error from the final base year run in Baton Rouge for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days shown in Figure 6-1.**

| September | October |
|---|---|

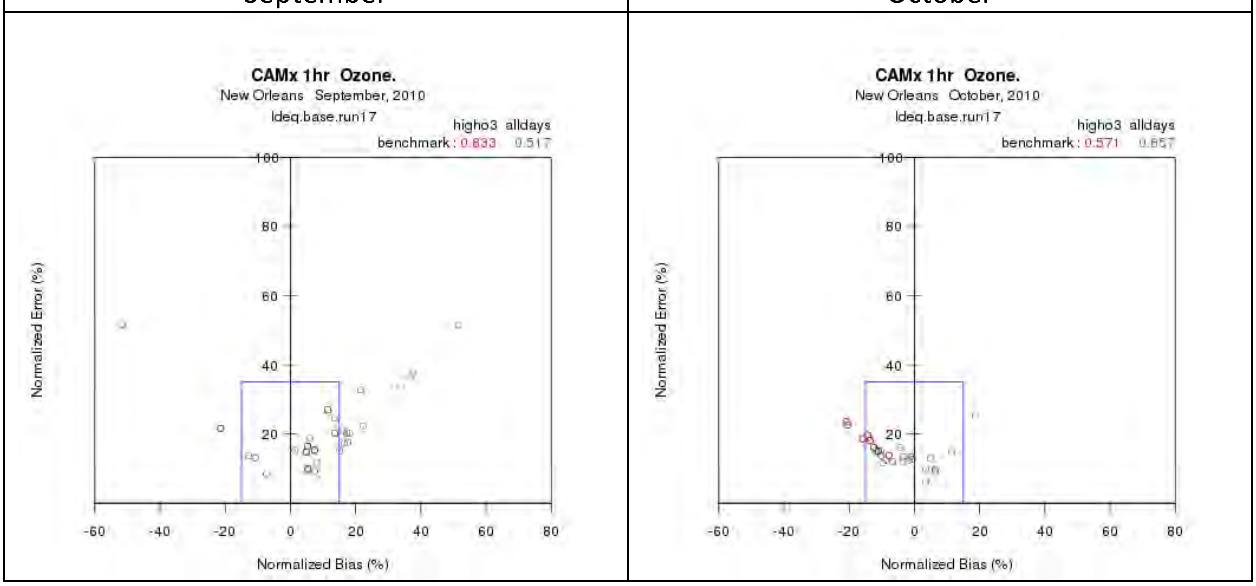



**Figure 6-32. "Goal" plots of daily normalized bias and error from the final base year run in New Orleans for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

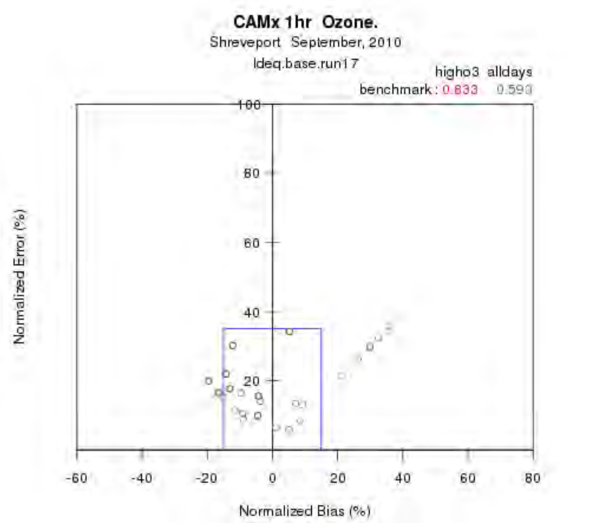
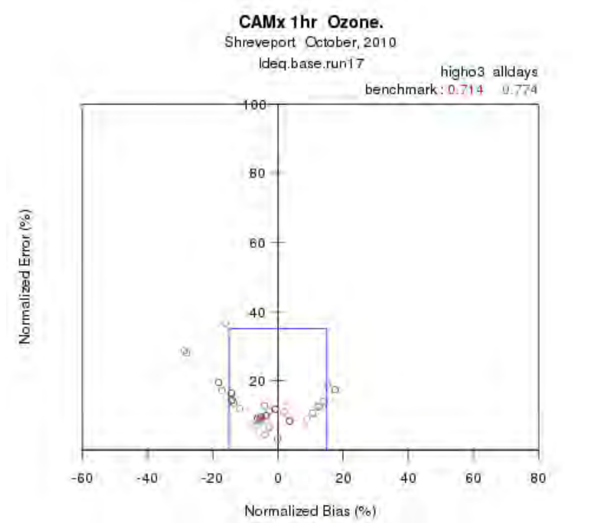
| September | October |
|---|---|
|  |  |





**Figure 6-33. "Goal" plots of daily normalized bias and error from the final base year run in Shreveport for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

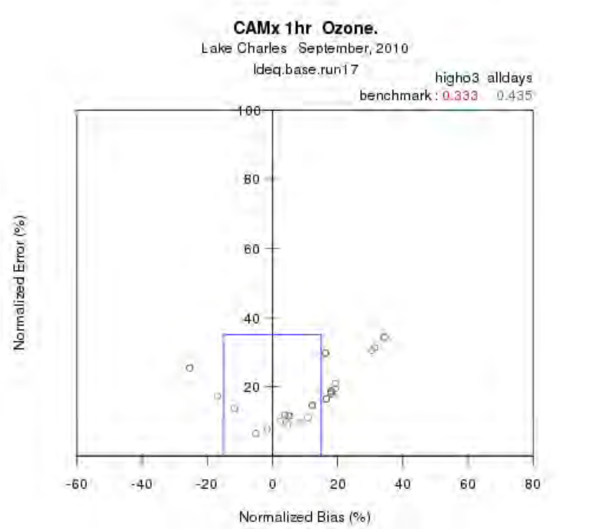
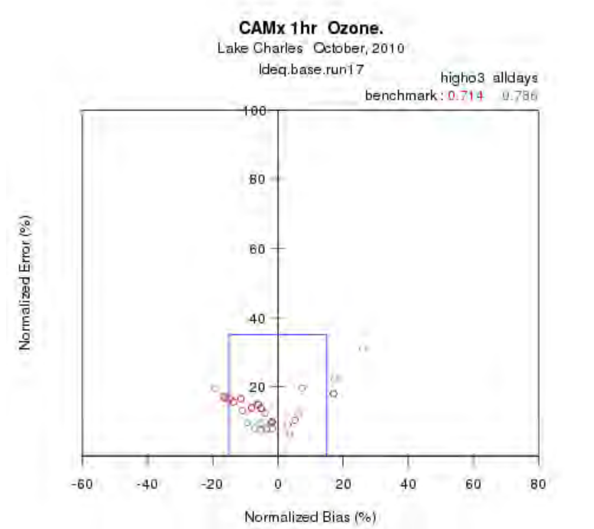
| September | October |
|---|---|
|  |  |





**Figure 6-34. "Goal" plots of daily normalized bias and error from the final base year run in Lake Charles for September (left) and October (right). The blue goal denotes statistics within the 1-hour performance benchmarks. Red points are the high ozone days.**

Time series of simulated and observed hourly ozone at the urban LSU monitor throughout September and October are shown in Figure 6-35 (compare to Figure 6-7). Performance in both September and October was quite good on an hourly basis, and the model properly captured the large intra-diurnal ranges of ozone. Similar time series for ozone are shown at the Dutchtown and Pride monitors in Figures 6-36 and 6-37 (compare to Figures 6-9 and 6-11). Again, performance was dramatically improved at both sites. However, nighttime ozone continued to be too high at Pride, taking on the characteristics typical of rural background ozone with small diurnal amplitude that is not influenced by scavenging from local NOx. Ozone observations suggest that a local NOx source contributed to nightly ozone reductions around the monitor that was not resolved by the model.

### 6.6.1 Regional Ozone Performance

September ozone over predictions in Louisiana may be related to various inaccuracies in local emission estimates to a certain extent (e.g., prescribed fire activity), but over predictions of regional (background) ozone entering Louisiana may contribute as well. We analyzed ozone performance in neighboring states to address this issue. Specifically, we identified CASTNET and AQS sites that are situated in rural areas to the east, north, and west of Louisiana (Figure 6-38) and calculated ozone performance statistics to gauge whether the model is adequately characterizing the amount of background surface ozone that should be entering Louisiana according to general wind patterns.

Figures 6-39 through 6-41 present daily normalized bias and gross error for 1-hour ozone on each day of September and October, in the form of bar chart time series, for the western, northern, and eastern groups of monitoring sites shown in Figure 6-38. In the west, a high bias prevailed in September but bias was much better and balanced in October, very similar to the bias patterns in Louisiana. The highest bias days were not associated with the highest ozone days in Louisiana. Good performance for gross error was achieved in both months. In the north, good performance was achieved for bias in both months, with a tendency for slight under prediction. All days except three were well within the ±15% benchmark. Very good performance for gross error was achieved, with typical values well below 20%. In the east, good performance was also achieved on most days of both months, with a more balanced positive and negative variability. Only six days exceeded the ±15% bias benchmark. Very good performance for gross error was achieved with values similar to the northern sites.

Note that the similarities between performance for the western regional sites and sites within Louisiana may be related to two factors: (1) the western sites were contained within the Louisiana 4 km grid, whereas the northern and eastern sites were all in the 12 km grid, suggesting a grid-specific sensitivity for the ozone simulation; and (2) western sites located along the Texas-Louisiana border may have received outflow from Louisiana on many of these days, which would lead to similar performance as seen in Lake Charles and Shreveport. Overall, the model simulated ozone patterns rather well in the region surrounding Louisiana during the entire modeling period. There was no indication that ozone formation and subsequent transport from neighboring states is improperly characterized.

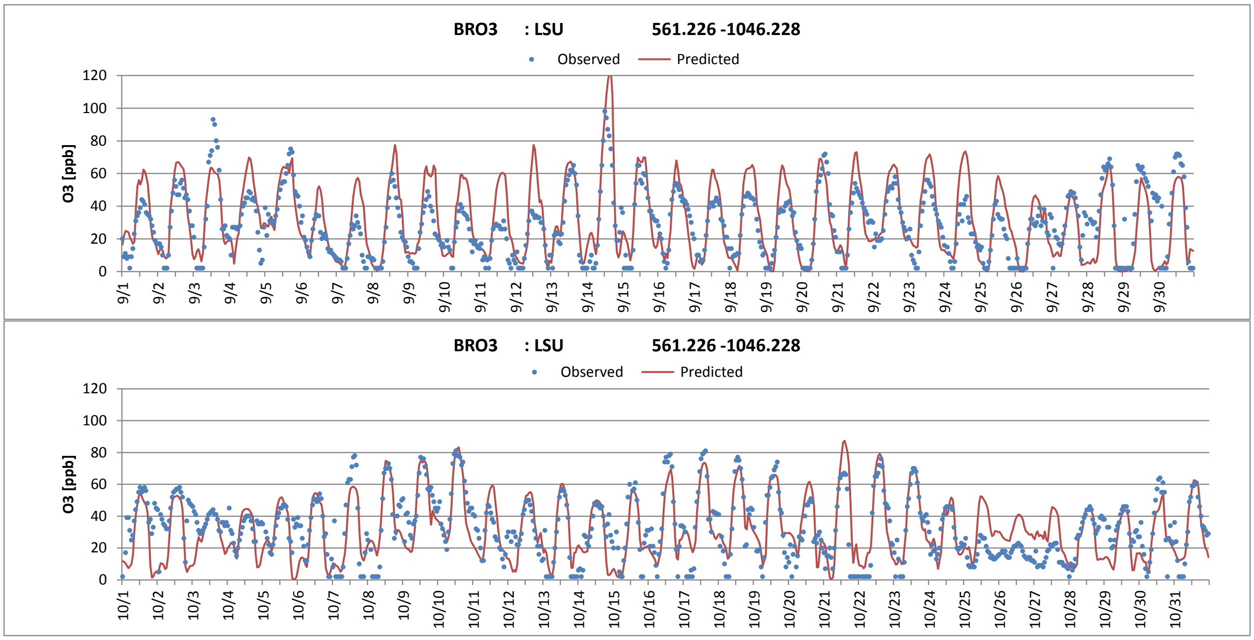



**Figure 6-35. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the LSU monitoring site during September (top) and October (bottom).**

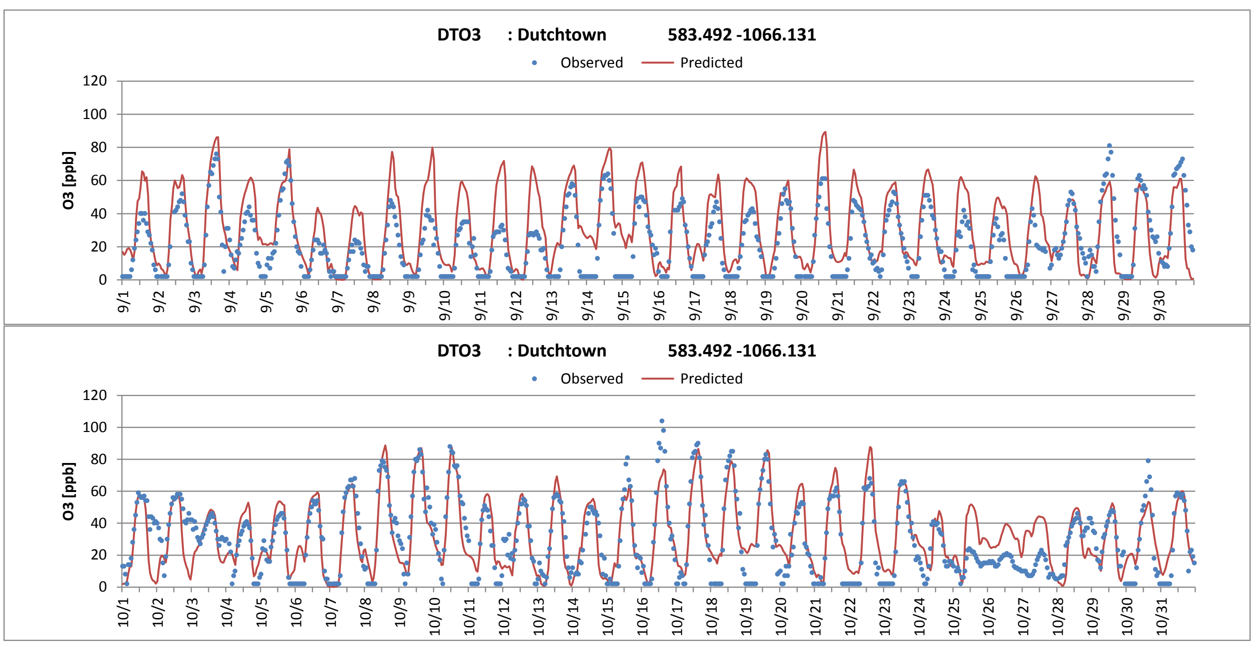



**Figure 6-36. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the Dutchtown monitoring site during September (top) and October (bottom).**

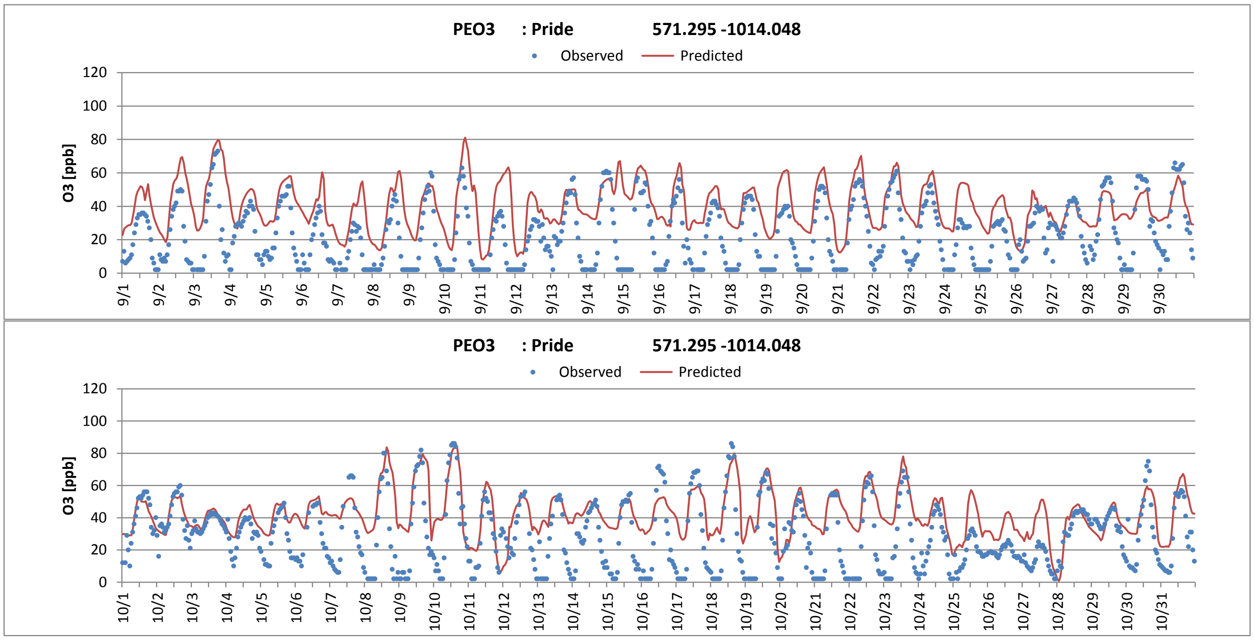



Figure 6-37. Hourly time series of observed (blue dots) and predicted (solid red line) ozone from the final base year run at the Pride monitoring site during September (top) and October (bottom).

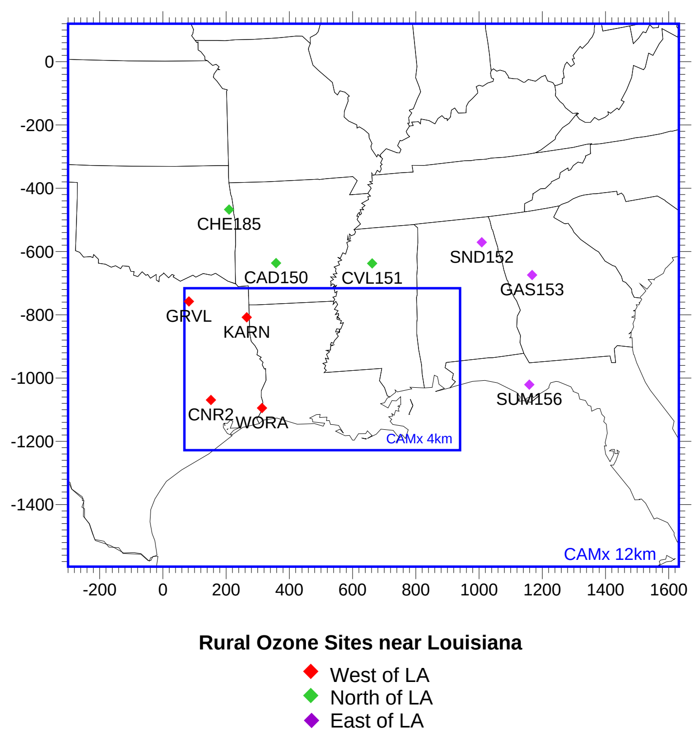



Figure 6-38. Locations of regional monitoring sites in areas surrounding Louisiana, relative to the CAMx modeling grid system.

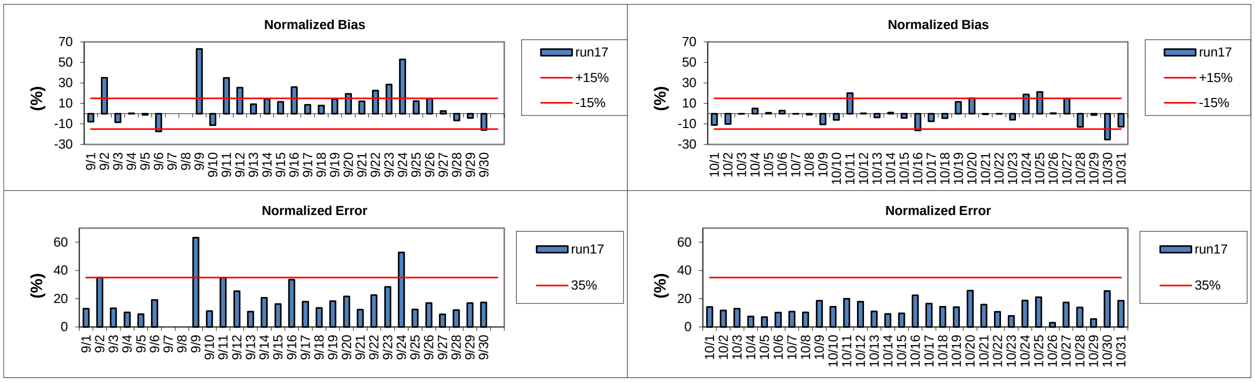



**Figure 6-39. Daily statistical performance for the final base year run at all western regional monitoring sites and for all hours when observed ozone was greater than 40 ppb, for September (left) and October (right), 2010. Top row: daily mean normalized bias (bars) with ±15% bias highlighted (red lines). Bottom row: daily mean normalized gross error (bars) with 35% error highlighted (red lines).**

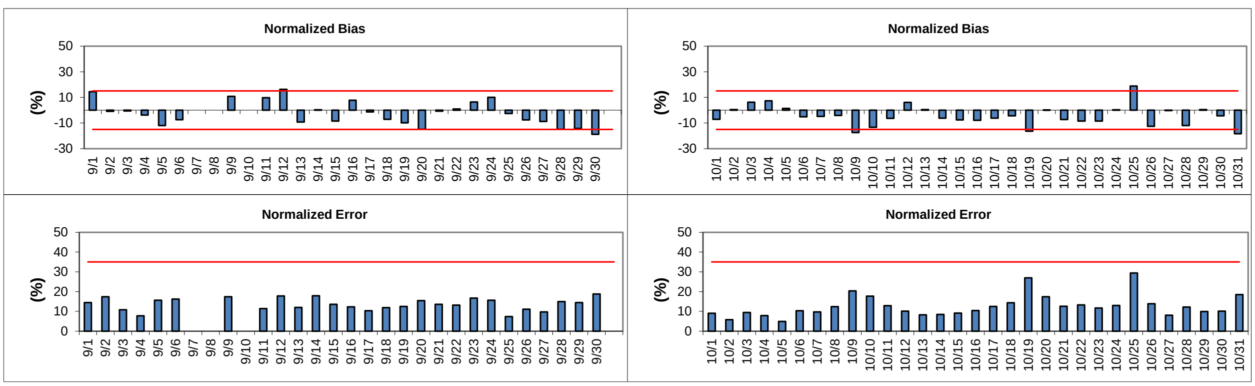



**Figure 6-40. As in Figure 6-42, but at all northern regional monitoring sites.**

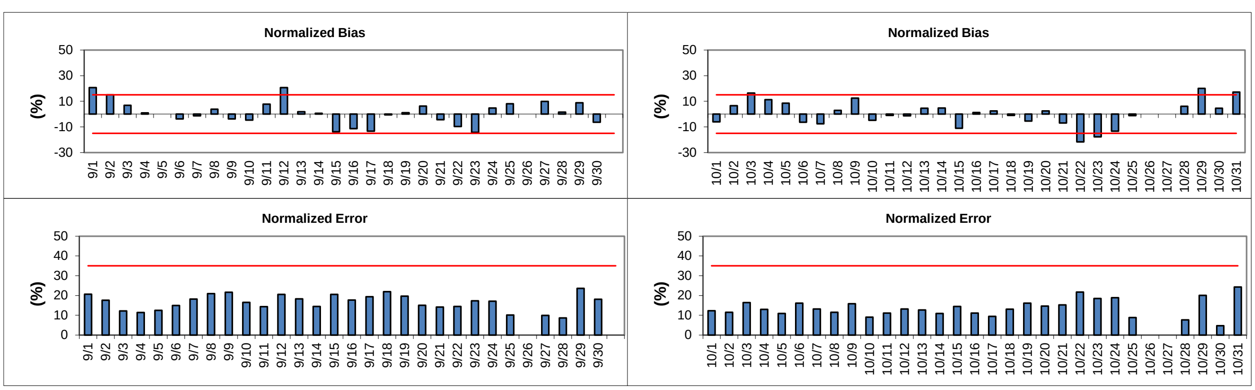



**Figure 6-41. As in Figure 6-42, but at all eastern regional monitoring sites.**

# 7.0 2017 FUTURE YEAR OZONE PROJECTION

## 7.1 Development of Future Year Emissions

Anthropogenic emission estimates for the September-October 2010 modeling period were projected to the 2017 future year. Details on the preparation of certain emission sectors are described in this section, specifically including Louisiana and Gulf of Mexico anthropogenic sources. Alpine Geophysics developed anthropogenic emission estimates for the remainder of the North American modeling domain. Day- and hour-specific BEIS biogenic and FINN fire emissions from the 2010 base year, as well as base year emissions estimates for Canada and Mexico, were used without modification for the 2017 future year.

As with the 2010 base year, emphasis was placed on developing 2017 emissions estimates within the State of Louisiana (LA) using EPS3 to convert the LA emission inventory into the hourly, chemically speciated, and gridded formats needed by CAMx. In some cases emissions were projected from 2010 to 2017 based on growth and control factors. In other cases emission modeling tools were used to estimate 2017 emissions for specific categories; MOVES/CONCEPT for on-road and NMIM for non-road sources. Area and point source emissions in Louisiana were prepared by ERG, working closely with the LDEQ. Gulf-wide offshore emissions were developed by ERG from the BOEM 2008 Gulf-wide Emission Inventory Study and by reviewing estimated oil and gas production rates for future years.

### 7.1.1 Emissions in Louisiana

The 2017 emissions were processed similarly to the approach used to develop the 2010 base year. EPS3 was set up to process criteria pollutant emissions into the CAMx configuration. EPS3 generated model-ready hourly point, area, non-road mobile, and on-road mobile emissions of CB6 compounds on the 36/12/4 km grid system. Certain CB6 VOCs were subsequently reverted back to CB05 speciation to be consistent with the decision to run the 2010 base year with CB05. Annual and ozone season emission estimates for most sectors were used to develop a representative weekday, Saturday and Sunday. Day specific estimates were developed for the on-road mobile sector. The remainder of this sub-section details the emissions processing by source category.

#### 7.1.1.1 Point Sources

The 2017 point source emissions are based on the 2010 point source inventory provided by LDEQ (2012a). For the purposes of this project, it was decided that all point sources not part of the Acid Rain Program (ARP) or future interstate cap-and-trade programs were to be held constant at their 2010 estimates.

The hourly, day-specific 2010 ARP point source inventory was first converted to annual ("typical") emission estimates for each point source by summing their emissions over the entire year. These annual estimates were then adjusted to reflect relevant control programs. Two types of emission limits were applied to the ARP units; those developed under the Clean Air Interstate Rule (CAIR), and any current Plant-wide Applicability Limits (PAL). LDEQ provided the

**Table 7-1. Louisiana 2015 CAIR Program annual NOx allocations.**

| Facility Name<br>Unit Designation | Unit ID<br>(ORIS) | Amount<br>tons/year | Facility Name<br>Unit Designation | Unit ID<br>(ORIS) | Amount<br>tons/year |
|---|---|---|---|---|---|
| Rodemacher - Unit 1 | 006190 | 233 | Morgan City Electrical Gen Facility | 001449 | 12 |
| Rodemacher - Unit 2 | | 2056 | Houma - 15 | 001439 | 9 |
| Rodemacher - Unit 3 | | 2584 | Houma - 16 | | 8 |
| RS Nelson - 6 | 001393 | 2780 | D G Hunter - 3 | 006558 | 4 |
| RS Nelson - 3 | | 72 | D G Hunter - 4 | | 9 |
| RS Nelson - 4 | | 361 | Hargis-Hebert Electric Gen - U-1 | 056283 | 20 |
| Big Cajun 2 - 2B3 | 006055 | 2923 | Hargis-Hebert Electric Gen - U-2 | | 29 |
| Big Cajun 2 - 2B1 | | 2883 | Natchitoches | 001450 | 0 |
| Big Cajun 2 - 2B2 | | 3138 | T J Labbe Electric - U-1 | 056108 | 12 |
| Dolet Hills | 000051 | 3487 | T J Labbe Electric - U-2 | | 10 |
| Entergy Little Gypsy - 1 | 001402 | 118 | Acadia Power Station - CT-1 | 055173 | 42 |
| Entergy Little Gypsy - 2 | | 209 | Acadia Power Station - CT-2 | | 62 |
| Entergy Little Gypsy - 3 | | 351 | Acadia Power Station - CT-3 | | 40 |
| Monroe | 001448 | 0 | Acadia Power Station - CT-4 | | 42 |
| Entergy Ninemile Point - 1 | 001403 | 17 | Bayou Cove Peaking Power - CTG-1 | 055433 | 3 |
| Entergy Ninemile Point - 2 | | 0 | Bayou Cove Peaking Power - CTG-2 | | 3 |
| Entergy Ninemile Point - 3 | | 43 | Bayou Cove Peaking Power - CTG-3 | | 3 |
| Entergy Ninemile Point - 4 | | 622 | Bayou Cove Peaking Power - CTG-4 | | 3 |
| Entergy Ninemile Point - 5 | | 467 | Big Cajun 1 - CTG2 | 001464 | 12 |
| Perryville Power Sta - 1-1 | 055620 | 110 | Big Cajun 1 - CTG1 | | 16 |
| Perryville Power Sta - 1-2 | | 203 | Big Cajun 1 - 1B1 | | 17 |
| Perryville Power Sta - 2-1 | | 82 | Calcasieu Power, LLC - GTG2 | 055165 | 65 |
| Sterlington - 10 | 001404 | 0 | Calcasieu Power, LLC - GTG1 | | 35 |
| Sterlington - 7AB | | 2 | Carville Energy Center - COG01 | 055404 | 132 |
| Sterlington - 7C | | 3 | Carville Energy Center - COG02 | | 150 |
| Entergy Waterford - 1 | 008056 | 152 | Evangeline Power (Coughlin) - 7-2 | 001396 | 71 |
| Entergy Waterford - 2 | | 95 | Evangeline Power (Coughlin) - 7-1 | | 81 |
| Entergy A B Paterson - 3 | 001407 | 0 | Evangeline Power (Coughlin) - 6-1 | | 52 |
| Entergy A B Paterson - 4 | | 0 | Exxon Mobil Louisiana 1 - 1A | 001391 | 140 |
| Entergy Michoud - 1 | 001409 | 0 | Exxon Mobil Louisiana 1 - 2A | | 150 |
| Entergy Michoud - 2 | | 163 | Exxon Mobil Louisiana 1 - 3A | | 148 |
| Entergy Michoud - 3 | | 537 | Exxon Mobil Louisiana 1 - 4A | | 908 |
| Entergy Louisiana 2 - 10 | 001392 | 0 | Exxon Mobil Louisiana 1 - 5A | | 284 |
| Entergy Louisiana 2 - 11 | | 0 | Plaquemine Cogen Facility - 500 | 055419 | 93 |
| Entergy Louisiana 2 - 12 | | 0 | Plaquemine Cogen Facility - 600 | | 103 |
| Entergy Willow Glen - 1 | 001394 | 10 | Plaquemine Cogen Facility - 700 | | 91 |
| Entergy Willow Glen - 2 | | 32 | Plaquemine Cogen Facility - 800 | | 96 |
| Entergy Willow Glen - 3 | | 0 | Quachita Power, LLC - CTGEN1 | 055467 | 29 |
| Entergy Willow Glen - 4 | | 52 | Quachita Power, LLC - CTGEN2 | | 24 |

| Facility Name<br>Unit Designation | Unit ID (ORIS) | Amount tons/year | Facility Name<br>Unit Designation | Unit ID (ORIS) | Amount tons/year |
|---|---|---|---|---|---|
| Entergy Willow Glen - 5 | | 0 | Quachita Power, LLC - CTGEN3 | | 28 |
| Teche Power Station - 2 | 001400 | 9 | R S Cogen - RS-5 | 055117 | 375 |
| Teche Power Station - 3 | | 254 | R S Cogen - RS-6 | | 368 |
| Arsenal Hill Power Plant | 001416 | 28 | Taft Cogeneration Facility - CT-2 | 055089 | 181 |
| Lieberman Power Plant - 4 | 001417 | 22 | Taft Cogeneration Facility - CT-1 | | 171 |
| Lieberman Power Plant - 3 | | 18 | Taft Cogeneration Facility - CT-3 | | 179 |
| Doc Bonin - 1 | 001443 | 4 | NISCO - Unit 1A | 050030 | 460 |
| Doc Bonin - 2 | | 26 | NISCO - Unit 2A | | 660 |
| Doc Bonin - 3 | | 17 | | | |

2015 CAIR allocations for all such sources in the State of Louisiana (Table 7-1). The 2010 annual estimates were adjusted to the 2015 CAIR values. In addition, the Big Cajun 2 unit was adjusted to account for its Plant-wide Applicability Limit from a recent consent decree (LDEQ, 2013b). The Big Cajun 2 facility emissions, based on PAL, were estimated at 8950 TPY NOx, 35590 TPY CO, and 287 TPY VOC.

New facilities and expansion projects at existing facilities (e.g., adding new units, expanding capacity, etc.) were included in the 2017 emission inventory. LDEQ (2013a) provided information and estimated emissions for seven new and six expansion projects expected to be on-line by 2017.

The sources were temporally allocated to month, day of week, and hours, according to source category code using default EPA profiles and cross-reference files. All point source emissions were speciated to CB6 compounds using default EPA profiles and cross-reference files. All ARP point sources were treated as elevated sources. The non-ARP points were processed as elevated sources when stack information indicated a sufficient plume rise to warrant elevated treatment. All point source emissions were located in the CAMx grid system according to their reported coordinates.

#### 7.1.1.2 Area Sources

The 2010 base year area source emissions inventory was projected to 2017 using a variety of projection factors based upon the projections of various surrogates, including: population, employment, vehicle miles travelled (VMT), and oil and gas production.

The population-based projection factor is based upon parish-level population estimates for 2010 and 2011 obtained from the US Census Bureau at the parish level (US Census, 2012). The annual population change (increase or decrease) was then applied for a 7-year period to develop the 2017 population based projection factor. Vehicle miles travelled (VMT) projection factors were based upon ENVIRON's development of 2017 on-road emissions and associated VMT activity. A state-wide VMT projection factor of 1.039 was estimated and applied to every parish.

Employment projections were obtained from the Louisiana Workforce Commission (LWC, 2013). The employment projections for 2020, based on a 2010 base year, were detailed by NAICS code and Regional Labor Market Area (RLMA); the specific RLMAs are defined below in Table 7-2. Employment projection factors were developed by linearly interpolating these data to 2017.

**Table 7-2. Louisiana Regional Labor Market Areas (RLMAs)**

| Regional Labor Market Area | Parishes |
|---|---|
| RLMA 1 - (New Orleans) | Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany |
| RLMA 2 - (Baton Rouge) | Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, Tangipahoa, Washington, West Baton Rouge, West Feliciana |
| RLMA 3 - (Houma) | Assumption, Lafourche, Terrebonne |
| RLMA 4 - (Lafayette) | Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, Vermilion |
| RLMA 5 - (Lake Charles) | Allen, Beauregard, Calcasieu, Cameron, Jefferson Davis |
| RLMA 6 - (Alexandria) | Avoyelles, Catahoula, Concordia, Grant, LaSalle, Rapides, Vernon, Winn |
| RLMA 7 - (Shreveport) | Bienville, Bossier, Caddo, Claiborne, Desoto, Lincoln, Natchitoches, Red River, Sabine, Webster |
| RLMA 8 - (Monroe) | Caldwell, East Carroll, Franklin, Jackson, Madison, Morehouse, Ouachita, Richland, Tensas, Union, West Carroll |

Oil and gas production projections were obtained from the *2013 Annual Energy Outlook (AEO)* published by the Energy Information Administration (EIA, 2012). The 2010 oil and gas production statistics and 2017 oil and gas production projections for the Onshore (Gulf Coast) and Offshore (Gulf – Shallow and Deep) regions were converted to a BTU basis for purposes of developing the projection factor; the resulting area source oil and gas projection factor was 1.594.

#### 7.1.1.3 On-Road Mobile Sources

Emissions from on-road vehicles are expected to fall significantly by 2017. Louisiana statewide total on-road emissions of TOG, CO, and NOx are estimated to be 33%, 30%, and 43% lower, respectively, than in 2010. The reductions are due to fleet turnover as new vehicles meet the latest emission standards and older higher-emitting vehicles retire. Fleet turnover more strongly impacts vehicle emissions than the projected increase in both vehicle populations and vehicle-miles traveled (VMT). The effects of the latest emission standards on vehicle emission rates are incorporated into EPA's Motor Vehicle Emission Simulator (MOVES) model. LDEQ provided ENVIRON with estimates of 2017 VMT by functional class and parish. An overall VMT growth of 4% was estimated for all parishes and road types.

Similarly to the approach for the 2010 base year, MOVES version 2010a (with database "movesdb20100830") was run in the mode referred to as "County Domain/Scale in Emission Rate Calculation" for three representative parishes. Each parish-level MOVES run used local input data provided by the LDEQ, including fuel properties, age distribution, and inspection and maintenance programs. MOVES estimated the 2017 emission factors for each pollutant and emission process by source type (vehicle class), fuel type, and representative parish, over a wide range of vehicle speeds and ambient temperature and humidity. The emission factors were formatted into a lookup table and then subsequently input to the emissions processor CONCEPT MV, a tool that replaces EPS3 for the on-road mobile sector.

First, CONCEPT calculated the emissions inventory by multiplying VMT and population with the appropriate MOVES emission factor for each grid cell and episode hour. The 2010 gridded temperature and humidity data were used in the emission factor lookup tables. A state-wide VMT projection factor of 1.039 was estimated and applied to every parish. CONCEPT then further processed the hourly gridded emissions into chemical species and output the emissions files formatted for CAMx. On-road statewide TOG, CO, and NOx emissions for 2017 totaled 153, 1,287, and 158 TPD, respectively.

#### 7.1.1.4 Off-Road Sources

Emissions from off-road vehicles are expected to decrease by 2017. Similar to 2010, the EPA's NMIM was used to generate 2017 Louisiana statewide parish-level off-road equipment emissions estimates for the months of September and October. NMIM is a tool for estimating on-road and non-road emissions by county for the entire US to support NEI updates. For this modeling effort NMIM version NMIM20090504 was run with county database NCD20090531 and NONROAD2008a.

The 2017 NMIM emission estimates were processed using EPS3. The off-road emissions were speciated to CB6 compounds, temporally allocated to day of week and hour of day, and spatially allocated using EPA default source category cross-reference files. Louisiana statewide total 2017 non-road emissions for a September weekday for TOG, CO, and NOx are 36%, 18%, and 37% lower than in 2010, respectively.

NONROAD and NMIM do not include emission estimates for railroad locomotives, aircraft, and marine vessels (excluding maintenance equipment). The 2010 Louisiana emissions for locomotives and aircraft were projected to 2020 using the EPA's Modeling Clearinghouse 2008-based Modeling Platform. Louisiana statewide total of VOC, CO and NOx for these sources are projected to decrease by 23%, 1%, and 23% respectively.

Emissions from commercial marine vessels servicing the ports along the Mississippi River and the Port of Lake Charles were processed separately from other area sources. The 2010 base year emissions from commercial marine shipping channels and ports were held constant for the 2017 modeling.

#### 7.1.1.5 Port Fourchon

The 2010 Port Fourchon emission estimates were projected to 2017 based on projections for Gulf oil and gas sources. Port Fourchon activity is directly linked to gulf development and production activity so it is reasonable to expect a similar future year pattern. Since the port emissions did not distinguish between fuel types, the base and future year gulf-wide non-platform estimates were used to develop pollutant-specific projection factors (see below for more information). The overall Gulf non-platform projections from 2010 to 2017 were 97% NOx, 96% CO, and 97% VOC.

#### 7.1.1.6 Haynesville Shale

As stated in Section 5.2.6, a 2009 NETAC study was referenced to estimate 2010 emissions due to Haynesville Shale exploration and production (Grant et al., 2009). A more recent analysis of the Haynesville Shale (Grant et al., 2013) was used to develop projection factors to adjust the 2010 base year exploration and production sources to 2017 estimates. This recent analysis was used for the 2017 projection primarily because it more accurately reflects slower development activity in this area than previously projected. However, the updates provided by Grant et al. (2013) do not extend back to 2010 and so were unavailable for use in developing the original base year inventory. The 2011 and 2017 "median" scenarios from Grant et al. (2013) for both production (well/area sources) and exploration (drills/non-road sources) were used to develop projection factors, which were then applied to the respective 2010 emission estimates. As with the 2010 inventory, the reported Haynesville Shale midstream emissions (e.g., compressors and processing plants) were not included in this projection and were assumed to be incorporated in the point source permitting database. Note that these sources were held constant at their 2010 values (Section 7.1.1.1).

Though there is variation on a source by source basis, the Haynesville Shale projections to 2017 from well production and exploration show an overall decrease in NOx, CO, and VOC of 81%, 80%, and 62% respectively. The production source estimates increase by 13% to 120% depending on the specific source type. However, exploration source estimates decrease by more than 80%. Exploration sources constitute a higher fraction of emissions than production sources, and so the overall reduction in emission is driven by exploration sources.

Spatial allocation of the 2017 Haynesville Shale emission estimates was the same as the 2010 base year. No additional information on future well locations was available for the Haynesville Shale area.

### 7.1.2 Gulf Sources

The 2010 base year offshore emissions inventory was projected to 2017 using projection factors based on oil and gas production projections from the *2013 Annual Energy Outlook (AEO)* (EIA, 2012). The 2010 oil and gas production statistics and 2017 oil and gas production projections for the Offshore (Gulf – Shallow and Deep) region were converted to a BTU basis for purposes of developing the projection factors. Three different projection factors were developed: oil only (1.050), natural gas only (0.830), and oil and natural gas combined (1.003). All three factors were applied to platform sources depending upon whether a particular emission source could be assigned specifically to oil or natural gas production. For most non-platform source categories, the combined oil and natural gas projection was applied because the category was not specifically assigned to oil or natural gas production. For four non-platform source categories (i.e., biogenic and geogenic emissions, commercial marine vessels, fishing vessels, and military vessels), the projected 2017 emissions were assumed to be identical to the 2010 base year emissions.

### 7.1.3 Future Emissions Outside of Louisiana

Anthropogenic emission estimates for states outside of LA, as well as for commercial marine shipping outside the Gulf of Mexico, were developed by Alpine Geophysics. County-level future year estimates for all source categories (including the on-road sector and commercial marine shipping outside of the Gulf of Mexico) were taken from the EPA 2020 modeling inventory used in the EPA's 2012 PM NAAQs modeling analyses. The 2020 inventory is based on projections applied to the 2008 NEIv2 database. This inventory version was obtained from the EPA FTP site (ftp.epa.gov/EmisInventory/2007v5/ 2020re_v5_07c_inputs.tar) on January 24, 2013. Documentation on the contents of the inventory can be obtained at ftp.epa.gov/EmisInventory/2007v5/ README_pm_naaqs_2007ee_2007re_2020re.txt. Emissions from Canada and Mexico were held constant at their respective base year estimates.

The 2020 inventories were processed using SMOKE3.1 using the ancillary data for spatial, temporal, and speciation distribution supplied with the emissions input files. Alpine generated gridded, speciated, temporally allocated emissions for the 36, 12, and 4 km modeling domains. The 2020 data were used for the 2017 future year modeling without year-to-year adjustment.

### 7.1.4 2017 Emissions Summary

Parish-level 2017 anthropogenic emissions are reported in Table 7-3. As biogenic and fire emissions are not reported at the county level they are not included in this comparison. Table 7-4 presents the percentage change in emission estimates from 2010 to 2017.

Point source emissions contribute 46% of all anthropogenic NOx in the 2010 base year inventory. We see a reduction in point source NOx of 8% by 2017. Points contribute a larger percentage (54%) of total anthropogenic NOx in 2017 because both on-road and off-road mobile sources have a much larger NOx reductions throughout the State (43% and 37% respectively).

A few parish-level anomalies in Table 7-4 include: 1) a few very large decreases in off-road emissions due to the reduction in Haynesville Shale drilling; 2) some very large percentage increases in point source emissions attributed to new sources; and 3) large reductions in point source NOx are due to the CAIR allocations.

Figures 7-1 through 7-3 show examples of the spatial distribution of 2017 total model-ready low-level (gridded – not including elevated point sources) emission of NOx, CO, and VOC over the 4 km modeling domain.

Table 7-3. Summary of 2017 Louisiana emissions (tons/day) for typical September weekday.

| Parish | NOx Area | NOx Off-road | NOx On-road | NOx Points | CO Area | CO Off-road | CO On-road | CO Points | VOC Area | TOG Off-road | TOG On-road | VOC Points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acadia | 1.15 | 1.08 | 3.09 | 8.10 | 2.20 | 5.32 | 24.22 | 2.89 | 4.45 | 0.66 | 3.05 | 1.27 |
| Allen | 0.37 | 0.55 | 1.23 | 1.65 | 1.37 | 1.50 | 8.82 | 2.95 | 1.86 | 0.13 | 1.13 | 0.19 |
| Ascension | 3.24 | 1.24 | 3.25 | 19.76 | 17.43 | 8.05 | 27.43 | 10.73 | 24.59 | 0.53 | 3.34 | 8.43 |
| Assumption | 0.89 | 0.31 | 2.05 | 3.33 | 13.27 | 1.73 | 19.22 | 2.52 | 2.15 | 0.19 | 3.86 | 1.42 |
| Avoyelles | 0.85 | 1.03 | 1.74 | 0.38 | 8.94 | 3.91 | 13.22 | 0.17 | 3.37 | 0.39 | 1.82 | 0.07 |
| Beauregard | 0.63 | 1.01 | 1.90 | 7.51 | 1.62 | 5.69 | 14.84 | 6.50 | 2.65 | 1.01 | 1.69 | 2.88 |
| Bienville | 0.58 | 0.76 | 1.66 | 5.58 | 1.22 | 1.81 | 10.74 | 2.92 | 1.50 | 0.25 | 0.98 | 1.51 |
| Bossier | 1.74 | 2.30 | 4.61 | 1.87 | 9.89 | 11.35 | 39.21 | 1.38 | 4.06 | 1.25 | 4.94 | 1.41 |
| Caddo | 5.25 | 5.71 | 8.61 | 3.68 | 6.55 | 47.06 | 72.29 | 2.18 | 15.30 | 3.66 | 8.73 | 3.15 |
| Calcasieu | 5.84 | 4.81 | 6.25 | 59.42 | 12.08 | 28.12 | 56.05 | 48.72 | 36.48 | 3.95 | 5.64 | 20.41 |
| Caldwell | 0.07 | 0.48 | 0.91 | 0.15 | 0.42 | 1.24 | 6.51 | 0.01 | 0.89 | 0.14 | 0.90 | 0.01 |
| Cameron | 0.33 | 0.79 | 0.55 | 22.05 | 1.77 | 6.88 | 4.09 | 21.81 | 1.29 | 1.83 | 0.49 | 2.70 |
| Catahoula | 0.23 | 0.60 | 0.84 | 0.00 | 2.28 | 2.22 | 5.69 | 0.00 | 1.05 | 0.27 | 0.67 | 0.00 |
| Claiborne | 0.24 | 0.23 | 1.23 | 0.70 | 0.70 | 2.90 | 8.02 | 1.01 | 1.69 | 0.55 | 0.98 | 0.22 |
| Concordia | 0.09 | 0.73 | 1.12 | 0.00 | 0.40 | 3.98 | 8.02 | 0.00 | 1.76 | 0.73 | 0.94 | 0.00 |
| De Soto | 0.87 | 5.03 | 2.62 | 16.13 | 2.24 | 6.49 | 17.73 | 8.69 | 4.49 | 1.50 | 1.57 | 7.44 |
| E Baton Rouge | 6.08 | 4.55 | 8.93 | 28.75 | 5.65 | 44.48 | 76.76 | 31.16 | 34.37 | 2.85 | 9.38 | 17.83 |
| East Carroll | 0.18 | 0.88 | 0.68 | 0.33 | 2.21 | 1.45 | 4.40 | 0.08 | 0.61 | 0.20 | 0.38 | 0.04 |
| East Feliciana | 0.16 | 0.21 | 0.88 | 0.79 | 0.58 | 2.20 | 6.28 | 0.25 | 0.92 | 0.47 | 0.87 | 1.31 |
| Evangeline | 0.56 | 0.62 | 1.57 | 3.05 | 3.41 | 3.48 | 11.31 | 8.89 | 6.11 | 0.61 | 1.42 | 0.46 |
| Franklin | 0.20 | 0.71 | 0.85 | 0.28 | 0.61 | 2.33 | 6.90 | 0.15 | 1.31 | 0.21 | 1.04 | 0.04 |
| Grant | 0.28 | 0.64 | 1.31 | 0.54 | 1.03 | 2.75 | 9.10 | 2.43 | 1.28 | 0.55 | 0.95 | 0.39 |
| Iberia | 2.73 | 1.26 | 1.25 | 4.63 | 21.49 | 10.11 | 10.41 | 4.49 | 6.55 | 0.83 | 1.27 | 1.96 |
| Iberville | 2.39 | 1.26 | 1.19 | 21.31 | 17.76 | 3.15 | 8.73 | 14.49 | 18.65 | 0.33 | 0.99 | 6.56 |
| Jackson | 0.68 | 0.12 | 0.95 | 4.81 | 1.12 | 1.56 | 6.55 | 4.66 | 1.17 | 0.18 | 0.85 | 2.04 |
| Jefferson | 7.90 | 11.79 | 7.73 | 7.79 | 6.51 | 58.66 | 76.77 | 4.91 | 28.40 | 4.96 | 10.73 | 2.17 |
| Jefferson Davis | 0.40 | 1.17 | 2.03 | 2.48 | 3.66 | 4.87 | 14.50 | 0.62 | 4.51 | 0.63 | 1.39 | 0.24 |
| Lafayette | 3.44 | 2.52 | 5.61 | 4.00 | 7.97 | 32.22 | 52.64 | 0.51 | 10.30 | 3.09 | 5.86 | 0.31 |
| Lafourche | 12.91 | 1.10 | 2.70 | 5.22 | 15.25 | 8.96 | 24.94 | 4.47 | 9.52 | 1.21 | 2.75 | 2.40 |
| La Salle | 0.23 | 0.30 | 1.06 | 0.42 | 0.45 | 2.13 | 7.05 | 0.11 | 1.47 | 0.26 | 0.81 | 0.04 |
| Lincoln | 0.82 | 0.77 | 2.64 | 4.10 | 2.40 | 5.39 | 19.83 | 1.47 | 3.13 | 0.34 | 1.85 | 0.87 |
| Livingston | 1.04 | 0.65 | 3.73 | 0.18 | 11.83 | 6.59 | 31.20 | 0.79 | 5.00 | 0.92 | 4.16 | 0.76 |
| Madison | 0.14 | 1.45 | 1.71 | 0.20 | 1.70 | 2.49 | 11.40 | 0.06 | 1.18 | 0.27 | 0.66 | 0.12 |
| Morehouse | 0.67 | 1.23 | 1.65 | 1.95 | 4.06 | 2.79 | 12.19 | 0.30 | 1.72 | 0.26 | 1.61 | 0.06 |
| Natchitoches | 1.25 | 0.77 | 3.24 | 6.53 | 3.41 | 3.48 | 21.93 | 3.81 | 4.67 | 0.39 | 2.00 | 3.39 |
| Orleans | 5.09 | 8.59 | 5.81 | 2.98 | 4.17 | 41.97 | 54.54 | 3.49 | 12.73 | 4.59 | 5.25 | 0.69 |
| Ouachita | 3.70 | 2.05 | 5.27 | 12.12 | 10.16 | 17.87 | 44.51 | 9.12 | 14.84 | 2.15 | 5.43 | 7.21 |
| Plaquemines | 0.88 | 16.81 | 0.70 | 20.42 | 1.44 | 14.06 | 5.77 | 8.95 | 3.63 | 3.31 | 0.98 | 5.42 |
| Pointe Coup | 1.26 | 1.12 | 1.03 | 29.39 | 21.37 | 3.79 | 7.76 | 102.61 | 2.72 | 0.35 | 0.80 | 2.10 |

| Parish | NOx | | | | CO | | | | VOC | TOG | TOG | VOC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points |
| Rapides | 1.93 | 2.02 | 6.39 | 16.44 | 7.82 | 13.81 | 49.93 | 9.31 | 9.84 | 1.33 | 5.33 | 1.86 |
| Red River | 0.35 | 2.72 | 1.04 | 0.56 | 0.76 | 3.49 | 7.94 | 0.42 | 0.64 | 0.96 | 1.27 | 0.34 |
| Richland | 0.51 | 1.00 | 1.82 | 2.00 | 6.53 | 2.09 | 11.84 | 0.94 | 2.03 | 0.17 | 1.00 | 0.31 |
| Sabine | 0.42 | 0.95 | 1.59 | 0.53 | 1.12 | 3.91 | 10.81 | 1.28 | 2.25 | 0.74 | 1.32 | 0.49 |
| St. Bernard | 0.80 | 1.32 | 0.49 | 10.52 | 0.69 | 7.52 | 5.20 | 4.87 | 1.18 | 1.48 | 0.82 | 3.45 |
| St. Charles | 2.21 | 2.21 | 1.96 | 27.21 | 2.40 | 6.74 | 17.03 | 22.52 | 15.48 | 0.80 | 1.69 | 12.65 |
| St. Helena | 0.11 | 0.06 | 0.51 | 1.11 | 0.47 | 0.60 | 4.01 | 0.33 | 1.51 | 0.06 | 0.58 | 0.25 |
| St. James | 0.94 | 0.88 | 0.80 | 14.62 | 1.16 | 2.12 | 6.22 | 6.50 | 6.30 | 0.19 | 0.66 | 3.91 |
| St. J Baptist | 1.12 | 8.92 | 2.04 | 6.56 | 2.92 | 5.39 | 16.56 | 4.97 | 5.65 | 0.96 | 1.74 | 4.71 |
| St. Landry | 1.27 | 1.83 | 3.78 | 3.81 | 8.72 | 7.49 | 29.07 | 1.51 | 5.60 | 0.87 | 3.45 | 2.11 |
| St. Martin | 1.56 | 0.57 | 2.14 | 2.72 | 15.19 | 5.91 | 17.05 | 1.80 | 4.70 | 1.21 | 2.05 | 1.34 |
| St. Mary | 2.58 | 1.25 | 1.48 | 17.99 | 13.92 | 8.32 | 13.30 | 19.42 | 10.01 | 0.81 | 1.46 | 3.67 |
| St. Tammany | 1.95 | 2.54 | 7.87 | 0.07 | 17.26 | 32.31 | 68.65 | 0.00 | 10.15 | 4.88 | 9.11 | 0.05 |
| Tangipahoa | 1.47 | 1.12 | 5.29 | 0.02 | 6.26 | 12.59 | 42.16 | 0.19 | 6.30 | 1.80 | 4.58 | 0.34 |
| Tensas | 0.18 | 0.73 | 0.65 | 0.00 | 3.61 | 1.69 | 3.94 | 0.00 | 1.38 | 0.26 | 0.32 | 0.00 |
| Terrebonne | 2.25 | 1.63 | 3.11 | 2.93 | 3.82 | 22.18 | 27.97 | 3.72 | 4.73 | 3.31 | 4.22 | 1.82 |
| Union | 0.76 | 0.25 | 1.44 | 0.55 | 3.29 | 3.24 | 9.51 | 0.32 | 2.49 | 0.33 | 1.18 | 0.45 |
| Vermilion | 1.34 | 1.10 | 1.93 | 9.40 | 11.69 | 10.05 | 15.14 | 3.52 | 3.96 | 1.72 | 2.15 | 1.46 |
| Vernon | 0.19 | 0.79 | 2.24 | 0.14 | 1.10 | 4.24 | 16.63 | 0.08 | 1.94 | 0.67 | 2.22 | 0.12 |
| Washington | 0.86 | 0.27 | 1.18 | 11.11 | 2.91 | 2.58 | 9.89 | 21.17 | 3.59 | 0.20 | 1.56 | 4.78 |
| Webster | 1.03 | 0.64 | 2.23 | 3.16 | 2.30 | 3.58 | 16.85 | 2.67 | 4.40 | 0.33 | 1.80 | 1.79 |
| W Baton Rouge | 1.33 | 1.60 | 1.21 | 2.17 | 6.38 | 6.71 | 8.89 | 6.28 | 4.41 | 0.78 | 0.81 | 1.65 |
| West Carroll | 0.37 | 0.38 | 0.49 | 2.38 | 7.20 | 1.14 | 3.76 | 0.23 | 1.19 | 0.09 | 0.54 | 0.06 |
| West Feliciana | 0.33 | 0.18 | 0.54 | 1.34 | 1.12 | 1.16 | 3.71 | 1.29 | 0.87 | 0.15 | 0.47 | 0.33 |
| Winn | 0.45 | 0.14 | 1.49 | 0.88 | 0.75 | 1.55 | 9.49 | 3.60 | 2.52 | 0.15 | 0.83 | 2.25 |
| **Total** | 101.65 | 122.32 | 157.94 | 450.81 | 360.00 | 585.42 | 1287.16 | 437.26 | 395.52 | 70.23 | 153.32 | 157.72 |

**Table 7-4. Percent change in Louisiana emissions from 2010 to 2017. Empty entries indicate no emissions were reported or estimated in 2010 and 2017.**

| | NOx | | | | CO | | | | VOC | TOG | TOG | VOC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parish | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points |
| Acadia | 6.3 | -30.7 | -42.2 | 0.2 | 3.6 | -15.3 | -30.9 | -8.4 | 4.4 | -31.4 | -32.3 | -4.4 |
| Allen | 16.5 | -32.9 | -43.0 | 0.0 | 3.1 | -15.3 | -32.4 | 0.0 | 9.6 | -31.5 | -32.9 | 0.0 |
| Ascension | 7.9 | -33.8 | -40.6 | 0.0 | 10.7 | -19.6 | -25.8 | 0.0 | 11.5 | -36.7 | -29.5 | 0.0 |
| Assumption | 2.3 | -31.0 | -27.9 | 0.0 | -0.3 | -18.3 | -26.0 | 0.0 | -0.2 | -38.7 | -28.6 | 0.0 |
| Avoyelles | 3.8 | -29.9 | -41.4 | 0.0 | -0.1 | -17.6 | -31.2 | 0.0 | 2.3 | -35.0 | -32.4 | 0.0 |
| Beauregard | 24.5 | -32.1 | -44.3 | 0.0 | 14.0 | -9.9 | -31.1 | 0.0 | 10.6 | -28.4 | -34.2 | 0.0 |
| Bienville | 0.2 | -71.0 | -46.6 | 0.0 | 0.4 | -42.8 | -33.3 | 0.0 | 3.8 | -55.3 | -36.5 | 0.0 |
| Bossier | 4.4 | -58.0 | -41.8 | 0.0 | 11.9 | -22.2 | -30.8 | 0.0 | 10.6 | -39.7 | -32.8 | 0.0 |
| Caddo | 0.8 | -56.6 | -42.7 | -9.3 | 1.3 | -18.2 | -31.3 | -8.9 | 9.9 | -37.5 | -34.0 | -1.1 |
| Calcasieu | 25.2 | -26.9 | -43.7 | 8.8 | 11.2 | -12.1 | -28.3 | 24.3 | 16.0 | -29.8 | -31.8 | 7.4 |
| Caldwell | -0.8 | -32.8 | -42.3 | 0.0 | -4.5 | -13.3 | -31.7 | 0.0 | -4.4 | -32.4 | -32.7 | 0.0 |
| Cameron | 7.7 | -4.6 | -45.5 | 488.3 | 0.1 | -17.0 | -32.0 | 1155.7 | 3.4 | -38.6 | -32.2 | 28.4 |
| Catahoula | 4.7 | -29.8 | -44.3 | | -0.3 | -18.1 | -32.7 | | 2.2 | -36.1 | -33.1 | |
| Claiborne | -3.8 | -28.8 | -44.6 | 0.0 | -7.1 | -9.1 | -33.0 | 0.0 | 0.6 | -27.3 | -34.7 | 0.0 |
| Concordia | 5.0 | -29.7 | -44.0 | | 2.4 | -13.9 | -32.7 | | 6.1 | -32.5 | -33.8 | |
| De Soto | 21.9 | -80.0 | -46.2 | -16.2 | 12.2 | -66.9 | -32.7 | 1.4 | 7.3 | -67.7 | -35.4 | 0.1 |
| E Baton Rouge | 6.2 | -29.6 | -44.0 | -1.6 | 5.7 | -14.4 | -31.9 | 1.4 | 4.2 | -31.4 | -39.0 | 0.0 |
| East Carroll | 0.3 | -27.0 | -47.0 | 0.0 | -0.3 | -23.4 | -34.7 | 0.0 | -0.7 | -36.0 | -37.6 | 0.0 |
| East Feliciana | 2.7 | -30.4 | -42.0 | 0.0 | -3.4 | -9.2 | -31.3 | 0.0 | 0.9 | -27.4 | -32.1 | 0.0 |
| Evangeline | 3.4 | -29.5 | -43.1 | 8.5 | -0.1 | -13.5 | -32.0 | -4.6 | 5.2 | -30.1 | -33.1 | -11.4 |
| Franklin | 3.4 | -30.6 | -41.6 | 0.0 | 1.3 | -18.2 | -30.6 | 0.0 | 5.6 | -33.3 | -31.0 | 0.0 |
| Grant | 7.4 | -31.4 | -45.8 | 0.0 | -0.7 | -10.2 | -30.7 | 0.0 | 4.4 | -31.0 | -33.3 | 0.0 |
| Iberia | 3.9 | -30.8 | -42.9 | 0.0 | 0.5 | -16.8 | -33.1 | 0.0 | 3.2 | -36.0 | -33.8 | 0.0 |
| Iberville | 3.6 | -27.6 | -42.7 | -0.6 | -0.3 | -26.0 | -26.8 | -0.9 | 3.0 | -41.6 | -30.2 | 0.5 |
| Jackson | 4.3 | -53.7 | -43.2 | 0.0 | 3.1 | -18.5 | -32.0 | 0.0 | 0.9 | -25.9 | -32.5 | 0.0 |
| Jefferson | 5.2 | -11.4 | -38.3 | -76.1 | 5.1 | -13.6 | -26.2 | 32.1 | 1.5 | -32.7 | -30.6 | 23.8 |
| Jefferson Davis | 5.3 | -31.1 | -45.5 | 0.0 | 0.7 | -11.7 | -32.4 | 0.0 | 5.1 | -30.0 | -34.8 | 0.0 |
| Lafayette | 6.6 | -34.5 | -42.1 | -31.6 | 2.3 | -12.1 | -27.8 | 7.8 | 6.1 | -29.8 | -31.3 | -10.7 |
| Lafourche | 2.0 | -27.6 | -42.6 | 0.0 | 1.6 | -19.2 | -28.7 | 0.0 | 8.3 | -40.5 | -31.5 | 0.0 |
| La Salle | 10.9 | -36.5 | -44.5 | 0.0 | 7.1 | -16.0 | -32.8 | 0.0 | 24.8 | -35.5 | -32.7 | 0.0 |
| Lincoln | -1.1 | -35.5 | -45.6 | 0.0 | 0.9 | -14.2 | -32.5 | 0.0 | 2.1 | -28.5 | -35.7 | 0.0 |
| Livingston | 9.5 | -38.3 | -38.6 | 0.0 | 12.6 | -15.7 | -24.4 | 0.0 | 9.1 | -33.2 | -27.8 | 0.0 |
| Madison | 0.5 | -29.2 | -48.4 | 0.0 | -0.2 | -17.2 | -33.3 | 0.0 | 2.1 | -35.8 | -40.0 | 0.0 |
| Morehouse | 2.0 | -29.8 | -42.7 | 0.0 | -0.9 | -20.3 | -32.1 | 0.0 | -0.5 | -34.7 | -33.4 | 0.0 |
| Natchitoches | -1.8 | -35.5 | -45.8 | 0.0 | -1.5 | -21.2 | -32.5 | 0.0 | 1.1 | -37.2 | -35.3 | 0.0 |
| Orleans | 9.0 | -16.2 | -45.1 | -66.3 | 8.9 | -13.9 | -29.5 | -28.2 | 21.2 | -32.7 | -34.6 | -23.8 |
| Ouachita | 4.7 | -33.5 | -42.1 | 4.0 | 4.6 | -14.0 | -31.3 | -0.2 | 6.2 | -30.6 | -33.0 | -0.8 |
| Plaquemines | 6.0 | -1.0 | -34.3 | 0.0 | 5.9 | -19.0 | -28.0 | 0.0 | 7.1 | -36.4 | -28.2 | 0.0 |

| Parish | NOx | | | | CO | | | | VOC | TOG | TOG | VOC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points | Area | Off-road | On-road | Points |
| Pointe Coup | 0.9 | -30.0 | -45.0 | -34.7 | -0.1 | -15.7 | -30.1 | -2.3 | 0.2 | -35.1 | -33.0 | 0.4 |
| Rapides | 10.2 | -31.7 | -44.2 | 9.6 | 4.8 | -13.2 | -31.9 | 0.4 | 6.3 | -31.3 | -34.0 | 16.4 |
| Red River | 25.4 | -80.0 | -38.8 | 0.0 | 11.7 | -66.8 | -29.8 | 0.0 | 21.8 | -64.7 | -30.4 | 0.0 |
| Richland | 2.9 | -30.7 | -46.7 | 0.0 | 0.7 | -18.3 | -32.7 | 0.0 | 7.3 | -36.2 | -35.7 | 0.0 |
| Sabine | 0.2 | -31.4 | -43.7 | 0.0 | 4.2 | -18.1 | -32.5 | 0.0 | 4.0 | -38.8 | -32.8 | 0.0 |
| St. Bernard | 10.2 | -9.0 | -33.2 | 0.0 | 12.0 | -21.4 | -24.3 | 0.0 | 26.0 | -40.5 | -28.1 | 0.0 |
| St. Charles | 5.0 | -19.5 | -44.2 | -25.4 | 3.8 | -20.9 | -28.2 | 0.3 | 3.5 | -40.9 | -32.1 | -0.4 |
| St. Helena | -0.7 | -46.3 | -42.9 | 0.0 | -8.7 | -17.3 | -31.2 | 0.0 | 1.6 | -23.8 | -33.1 | 0.0 |
| St. James | 4.6 | -24.9 | -44.3 | 0.0 | -0.6 | -22.8 | -28.6 | 0.0 | 1.6 | -39.3 | -32.2 | 0.0 |
| St. J Baptist | 4.3 | -3.5 | -43.9 | 7.9 | 1.3 | -17.9 | -30.9 | 10.7 | 1.4 | -32.9 | -33.9 | 11.3 |
| St. Landry | 4.4 | -30.5 | -43.0 | 0.0 | 0.9 | -14.8 | -31.2 | 0.0 | 2.8 | -31.8 | -33.0 | 0.0 |
| St. Martin | 4.5 | -28.7 | -42.3 | 0.0 | 2.4 | -12.0 | -30.7 | 0.0 | 4.8 | -32.6 | -32.0 | 0.0 |
| St. Mary | 4.7 | -27.7 | -43.0 | -15.4 | 0.7 | -19.5 | -28.6 | 0.1 | 4.7 | -39.7 | -31.7 | 0.0 |
| St. Tammany | 7.2 | -34.1 | -40.7 | 0.0 | 9.2 | -11.1 | -30.1 | 0.0 | 5.3 | -31.5 | -32.4 | 0.0 |
| Tangipahoa | 7.2 | -33.6 | -43.8 | 0.0 | 8.1 | -10.9 | -31.1 | 0.0 | 5.8 | -29.5 | -33.7 | 0.0 |
| Tensas | -1.9 | -29.5 | -47.7 | | -1.0 | -21.4 | -35.1 | | 0.8 | -36.9 | -38.8 | |
| Terrebonne | 17.3 | -29.0 | -37.7 | 1.6 | 7.6 | -14.6 | -29.9 | 0.4 | 7.2 | -35.4 | -30.4 | 0.1 |
| Union | 3.6 | -41.5 | -44.2 | 0.0 | 0.9 | -16.4 | -32.8 | 0.0 | -0.3 | -30.4 | -33.6 | 0.0 |
| Vermilion | 2.8 | -25.0 | -40.6 | 0.0 | 0.5 | -13.6 | -30.9 | 0.0 | 2.9 | -33.1 | -31.6 | 0.0 |
| Vernon | 2.4 | -34.7 | -42.6 | 0.0 | -2.0 | -10.5 | -32.1 | 0.0 | 2.0 | -28.3 | -32.3 | 0.0 |
| Washington | 5.1 | -40.0 | -40.5 | 0.0 | 0.9 | -19.4 | -30.5 | 0.0 | 3.6 | -34.4 | -31.7 | 0.0 |
| Webster | -1.2 | -57.2 | -44.5 | 0.0 | 0.5 | -24.5 | -32.3 | 0.0 | 2.5 | -42.3 | -34.5 | 0.0 |
| W Baton Rouge | 5.3 | -15.0 | -45.8 | 0.0 | 1.9 | -12.8 | -29.4 | 0.0 | 8.0 | -29.0 | -33.5 | 0.0 |
| West Carroll | 0.7 | -30.9 | -43.6 | 0.0 | -0.1 | -19.7 | -31.3 | 0.0 | 0.9 | -31.0 | -31.4 | 0.0 |
| West Feliciana | 4.2 | -39.7 | -43.3 | 0.0 | -3.4 | -23.1 | -32.1 | 0.0 | 0.4 | -37.9 | -33.0 | 0.0 |
| Winn | 10.0 | -48.3 | -47.0 | 0.0 | -0.4 | -18.7 | -34.7 | 0.0 | 4.1 | -28.9 | -37.2 | 0.0 |
| **Total** | 6.0 | -37.3 | -42.8 | -7.9 | 3.2 | -17.6 | -30.3 | 6.6 | 6.4 | -36.0 | -33.0 | 1.7 |

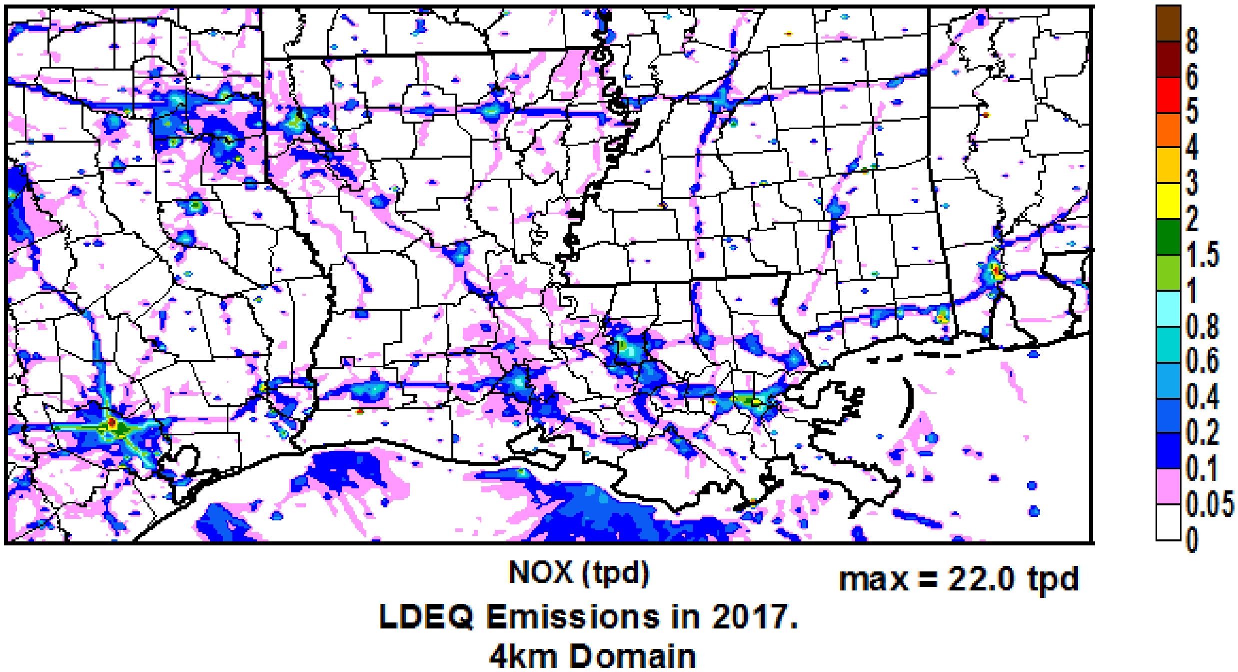



**Figure 7-1. Spatial distribution of 2017 total (anthropogenic and biogenic) surface NOx emissions (tons/day).**

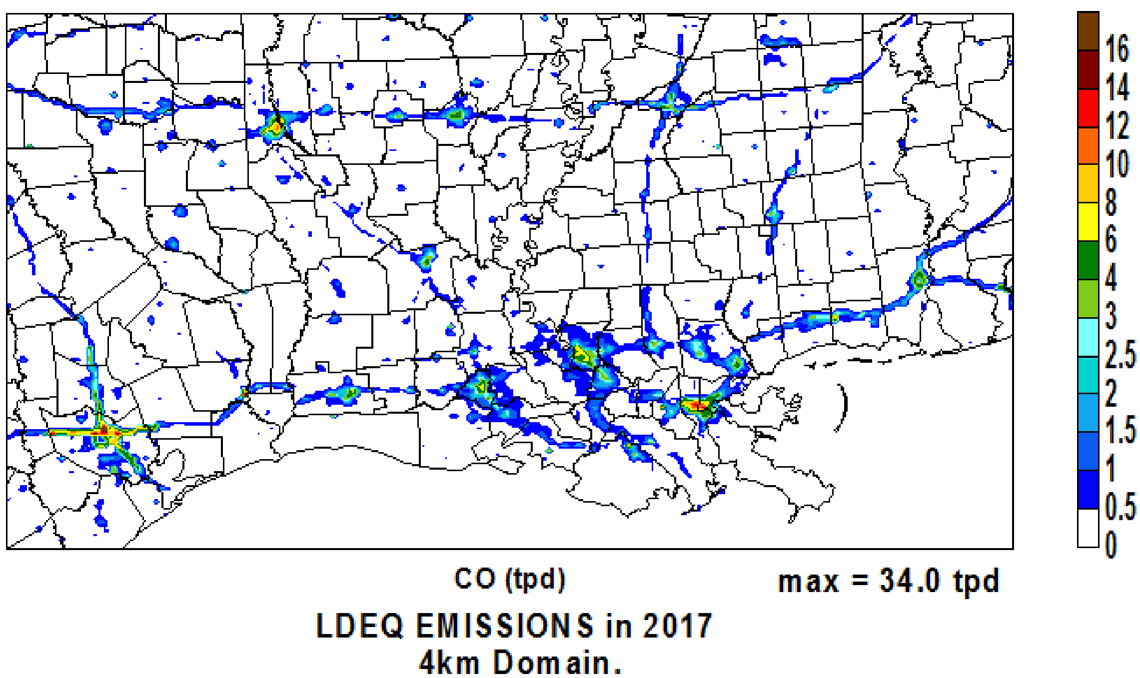



**Figure 7-2. Spatial distribution of 2017 total surface CO emissions (tons/day).**

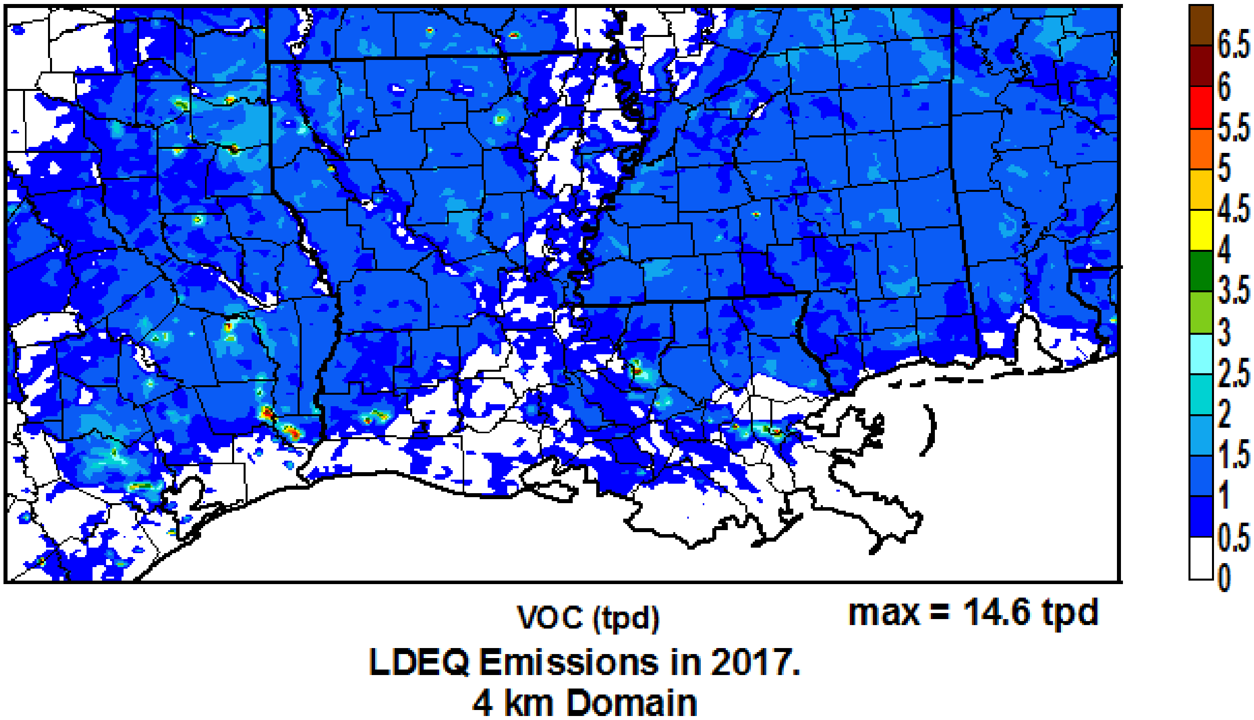



**Figure 7-3. Spatial distribution of 2017 total (anthropogenic and biogenic) surface VOC emissions (tons/day).**

## 7.2 Ozone Modeling and Attainment Test

CAMx was run using the final 2010 base year configuration (Run 17) described in Section 6.6, except that the 2010 "actual" emissions were exchanged with alternative inputs to yield two new runs: (1) "typical" 2010 base year emissions that reflect annual-averaged CAMD/ARP emissions (instead of day-specific); and (2) projected 2017 future year emissions as described above. Additionally, the 2017 emission estimates were converted to CB05 speciation to be consistent with the final base year configuration. Predicted daily maximum 8-hour ozone ($DM8O_3$) concentrations throughout the September-October modeling period were extracted from the CAMx results for both 2010 typical and 2017 future simulations. These modeled concentrations were supplied to the EPA Modeled Attainment Test Software (MATS) tool, which tabulated the change in $DM8O_3$ at each site, determined site-specific relative response factors (RRF) averaged over all high ozone days, and applied the RRFs to current design values (DV) to estimate the 2017 DV at each site. The steps in this procedure are outlined below.

### 7.2.1 Summary of the MATS Technique

EPA guidance (EPA, 2007) outlines the approach used by MATS to project base year DVs to a target attainment year. It begins by calculating the base year average DV for each monitoring site; in this case our base year is 2010. As exemplified below, the base year average DV is defined as a 3-year average of annual DVs centered on the base year, or more precisely, a weighted 5-year average of the annual $4^{th}$ highest $DM8O_3$ at each site.

2010 DV: average of annual 4th highest $DM8O_3$ between 2008-2010
2011 DV: average of annual 4th highest $DM8O_3$ between 2009-2011
2012 DV: average of annual 4th highest $MD8O_3$ between 2010-2012

| | | |
|---|---|---|
| 2010 average DV | = | (2010 DV + 2011 DV + 2012 DV)/3 |
| | = | 1×(2008 4th highest $DM8O_3$)/9 + |
| | | 2×(2009 4th highest $DM8O_3$)/9 + |
| | | 3×(2010 4th highest $DM8O_3$)/9 + |
| | | 2×(2011 4th highest $DM8O_3$)/9 + |
| | | 1×(2012 4th highest $DM8O_3$)/9 |

MATS is distributed with official DV data through 2008. We imported official DV data for the years 2009-2012 for the whole US.

Model results are then used to calculate 2010-2017 RRFs for each site. Hence, model results are not used in an absolute sense to determine attainment in 2017, but rather used in an episode-averaged relative sense to scale the observation-based average DV. For a given site, the RRF is defined as the ratio of the episode-mean 2017 $DM8O_3$ to the episode-mean 2010 $DM8O_3$. Episode means are determined over the days when the model predicts 2010 $DM8O_3$ above a minimum concentration threshold, preferably the current ozone standard (75 ppb in this case). The RRF is then applied directly to the 2010-2012 average DV to project a 2017 DV for each site.

MATS provides options to define how the $DM8O_3$ is chosen from the model grid output to represent simulated ozone at each monitor location. The user selects whether to search a 1x1, 3x3, 5x5, or 7x7 array of grid cells centered on the monitor. EPA guidance states that a larger array of grid cells should be used with finer resolution grids; 1x1 for 36-km grids, 3x3 for 12-km grids, or 7x7 for 4-km grids. Further, MATS allows the user to choose whether an average over the grid array is extracted, or the maximum value among all cells in the array is extracted. In our case using 4 km grids over Louisiana, we set the search array to 7x7 and selected the maximum predicted value in that array.

MATS then determines the number of days over the modeling period when simulated base year $DM8O_3$ is above a minimum concentration threshold from which to calculate the episode-average RRF at each site. We configured MATS to first find the number of days above 75 ppb, and MATS checks that at least 10 days meet this criterion. If 10 days are not found for a given site, then MATS lowers the critical value by 1 ppb successively until 10 days are found. We set the lower limit to 60 ppb; if 10 days are still not found at the lower limit, then MATS reduces the number of days successively until a minimum of 5 days are found. If at 60 ppb the minimum 5 days are not found, then an RRF is not calculated for that site. If at some point the minimum criteria for $DM8O_3$ concentration and number of days are met, then the RRF calculation proceeds.

Finally, MATS performs an "unmonitored area analysis" by extrapolating site-specific future year DVs to the entire modeling grid using modeled spatial gradients to help form the resulting DV surface. These fields are then plotted to indicate any areas expected to exceed the ozone standard in unmonitored areas of the State.

### 7.2.2 2017 DV Projection Results

Table 7-5 presents the 2010-2012 average DVs at each active monitoring site in Louisiana and the corresponding future year DVs projected by MATS. Missing values in the table indicate insufficient observation data from which to calculate a valid base year DV. All sites are projected to be below the 75 ppb ozone NAAQS in 2017.

Figure 7-4 displays the unmonitored area calculation for the portion of the 4 km grid covering the State of Louisiana. All projected DVs are below the 75 ppb NAAQS throughout the State. Areas contoured in white show locations where DVs are either estimated to be below 40 ppb, or are missing because they could not be extrapolated by MATS.

### 7.2.3 2017 Sensitivity Tests

Two emission sensitivity tests were run for the 2017 future year to quantify effects from simple across-the-board reductions in Louisiana anthropogenic NOx and VOC emissions. An arbitrary reduction of 30% was applied first to NOx (no change to VOC) and then to VOC (no change to NOx). All 2017 model-ready anthropogenic emissions in grid cells covering the State were scaled downward, including all low-level (gridded) sources and point sources. Emissions outside the State were not affected, nor were biogenic and FINN fire sources throughout the 4 km grid.

Table 7-6 lists the site-specific 2017 DV projections for the NOx test and Figure 7-5 displays the corresponding State-wide unmonitored analysis projected from the 2010-2012 average DV. No areas of the State exceed the 75 ppb ozone NAAQS.

Table 7-7 lists the site-specific 2017 DV projections for the VOC test and Figure 7-6 displays the corresponding unmonitored analysis. Again, no area exceed the 75 ppb standard. However, ozone reductions are not as large as the NOx test by typically 2-3 ppb. This suggests that while both NOx and VOC reductions are effective in reducing ozone throughout the State, ozone tends to be somewhat more responsive to NOx reductions. This effect could be more quantitatively analyzed through the use of CAMx probing tools, such as the Ozone Source Apportionment Tool (OSAT) or the Decoupled Direct Method (DDM) of sensitivity analysis.

**Table 7-5. Base year DM8$O_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV.**

| | | Base Year | Future Year |
|---|---|---|---|
| **AIRS Site ID** | **Parish** | **2010-12 DV** | **2017 DV** |
| 220050004 | Ascension | 76 | 70 |
| 220110002 | Beauregard | | |
| 220150008 | Bossier | 77 | 68 |
| 220170001 | Caddo | 74 | 70 |
| 220190002 | Calcasieu | 74 | 68 |
| 220190008 | Calcasieu | 66 | 61 |
| 220190009 | Calcasieu | 73 | 67 |
| 220330003 | E Baton Rouge | 79 | 73 |
| 220330009 | E Baton Rouge | 75 | 69 |
| 220330013 | E Baton Rouge | 72 | 66 |
| 220331001 | E Baton Rouge | 72 | 66 |
| 220430001 | Grant | | |
| 220470007 | Iberville | 71 | 64 |
| 220470009 | Iberville | 74 | 67 |
| 220470012 | Iberville | 75 | 68 |
| 220511001 | Jefferson | 75 | 68 |
| 220550005 | Lafayette | | |
| 220550007 | Lafayette | 72 | 64 |
| 220570004 | Lafourche | 72 | 66 |
| 220630002 | Livingston | 75 | 69 |
| 220710012 | Orleans | 70 | 63 |
| 220730004 | Ouachita | 64 | 58 |
| 220770001 | Pointe Coupee | 75 | 70 |
| 220870002 | St. Bernard | | |
| 220870009 | St. Bernard | 69 | 63 |
| 220890003 | St. Charles | 71 | 65 |
| 220930002 | St. James | 68 | 64 |
| 220950002 | St. J. Baptist | 74 | 69 |
| 221010003 | St. Mary | | |
| 221030002 | St. Tammany | 74 | 65 |
| 221210001 | W Baton Rouge | 71 | 65 |

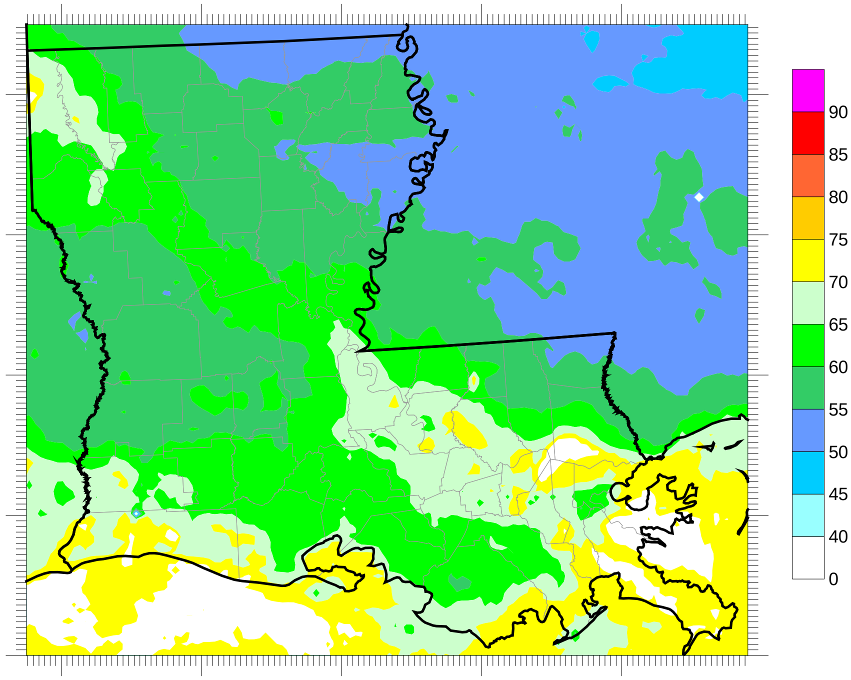



**Figure 7-4. MATS-derived 2017 DM8$O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana.**

**Table 7-6. Base year DM8O$_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection in response to an additional 30% across-the-board anthropogenic NOx reduction in Louisiana. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV.**

| AIRS Site ID | Parish | Base Year 2010-12 DV | Future Year 2017 DV |
|---|---|---|---|
| 220050004 | Ascension | 76 | 66 |
| 220110002 | Beauregard | | |
| 220150008 | Bossier | 77 | 65 |
| 220170001 | Caddo | 74 | 69 |
| 220190002 | Calcasieu | 74 | 66 |
| 220190008 | Calcasieu | 66 | 60 |
| 220190009 | Calcasieu | 73 | 64 |
| 220330003 | E Baton Rouge | 79 | 70 |
| 220330009 | E Baton Rouge | 75 | 66 |
| 220330013 | E Baton Rouge | 72 | 63 |
| 220331001 | E Baton Rouge | 72 | 63 |
| 220430001 | Grant | | |
| 220470007 | Iberville | 71 | 60 |
| 220470009 | Iberville | 74 | 63 |
| 220470012 | Iberville | 75 | 65 |
| 220511001 | Jefferson | 75 | 64 |
| 220550005 | Lafayette | | |
| 220550007 | Lafayette | 72 | 61 |
| 220570004 | Lafourche | 72 | 62 |
| 220630002 | Livingston | 75 | 65 |
| 220710012 | Orleans | 70 | 60 |
| 220730004 | Ouachita | 64 | 54 |
| 220770001 | Pointe Coupee | 75 | 66 |
| 220870002 | St. Bernard | | |
| 220870009 | St. Bernard | 69 | 60 |
| 220890003 | St. Charles | 71 | 62 |
| 220930002 | St. James | 68 | 60 |
| 220950002 | St. J. Baptist | 74 | 65 |
| 221010003 | St. Mary | | |
| 221030002 | St. Tammany | 74 | 61 |
| 221210001 | W Baton Rouge | 71 | 63 |

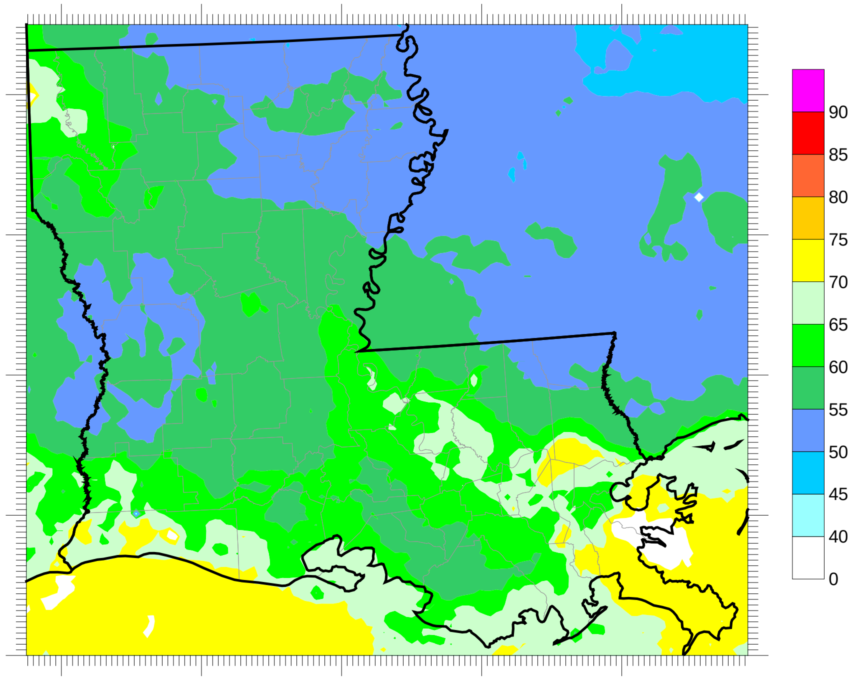



**Figure 7-5. MATS-derived 2017 DM8$O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana; response to an additional 30% across-the-board anthropogenic NOx reduction in Louisiana.**

**Table 7-7. Base year DM8O$_3$ design values at each active monitoring site in Louisiana for the 2010-2012 average and the 2017 projection in response to an additional 30% across-the-board anthropogenic VOC reduction in Louisiana. Values exceeding the current 75 ppb ozone NAAQS are highlighted in red. Blank entries indicate insufficient data from which to calculate the base year DV.**

| AIRS Site ID | Parish | Base Year 2010-12 DV | Future Year 2017 DV |
|---|---|---|---|
| 220050004 | Ascension | 76 | 69 |
| 220110002 | Beauregard | | |
| 220150008 | Bossier | 77 | 68 |
| 220170001 | Caddo | 74 | 70 |
| 220190002 | Calcasieu | 74 | 67 |
| 220190008 | Calcasieu | 66 | 61 |
| 220190009 | Calcasieu | 73 | 67 |
| 220330003 | E Baton Rouge | 79 | 72 |
| 220330009 | E Baton Rouge | 75 | 68 |
| 220330013 | E Baton Rouge | 72 | 66 |
| 220331001 | E Baton Rouge | 72 | 66 |
| 220430001 | Grant | | |
| 220470007 | Iberville | 71 | 63 |
| 220470009 | Iberville | 74 | 66 |
| 220470012 | Iberville | 75 | 68 |
| 220511001 | Jefferson | 75 | 67 |
| 220550005 | Lafayette | | |
| 220550007 | Lafayette | 72 | 64 |
| 220570004 | Lafourche | 72 | 65 |
| 220630002 | Livingston | 75 | 68 |
| 220710012 | Orleans | 70 | 62 |
| 220730004 | Ouachita | 64 | 57 |
| 220770001 | Pointe Coupee | 75 | 69 |
| 220870002 | St. Bernard | | |
| 220870009 | St. Bernard | 69 | 62 |
| 220890003 | St. Charles | 71 | 64 |
| 220930002 | St. James | 68 | 63 |
| 220950002 | St. J. Baptist | 74 | 68 |
| 221010003 | St. Mary | | |
| 221030002 | St. Tammany | 74 | 64 |
| 221210001 | W Baton Rouge | 71 | 65 |

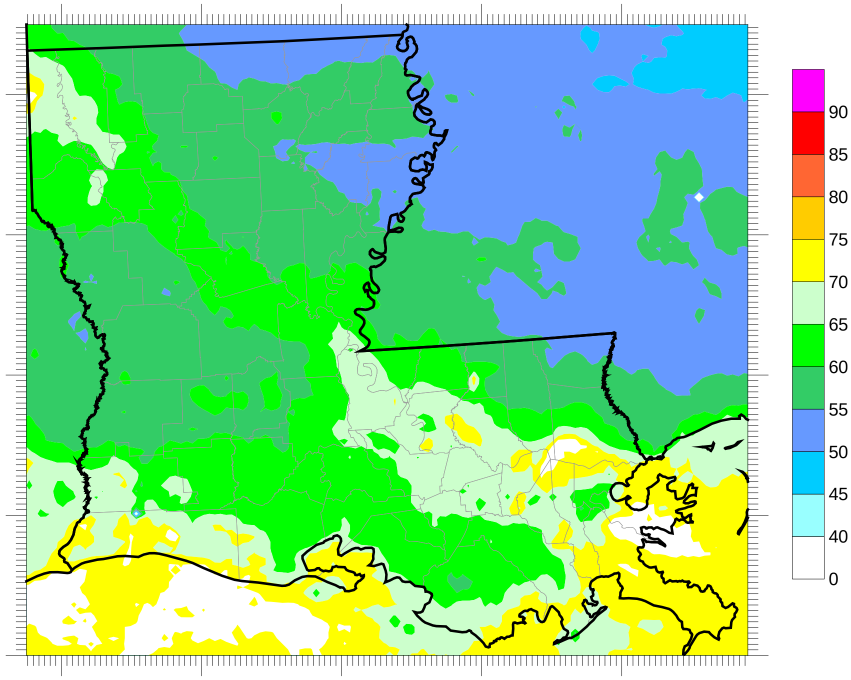



**Figure 7-6. MATS-derived 2017 DM8$O_3$ design value projection from the 2010-2012 average design value for un-monitored areas in Louisiana; response to an additional 30% across-the-board anthropogenic VOC reduction in Louisiana.**

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# APPENDIX F: TECHNICAL SUPPORT DOCUMENT - FUTURE YEAR EMISSION INVENTORY PROJECTIONS FOR THE BATON ROUGE 5-PARISH OZONE NONATTAINMENT AREA

# Technical Support Document

# Future Year Emission Inventory Projections for the Baton Rouge 5-Parish Ozone Nonattainment Area

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ENVIRON

## CONTENTS

**1.0 INTRODUCTION ........................................................................................................1**

**2.0 ON-ROAD MOBILE SOURCES .............................................................................................4**

2.1 Model Inputs ..........................................................................................................4

2.2 On-road Emission Inventory Results ........................................................................9

2.3 Stage II Refueling Emissions ...................................................................................10

**3.0 OFF-ROAD MOBILE SOURCES ...........................................................................................12**

3.1 NONROAD Equipment ...........................................................................................12

3.2 Aircraft .................................................................................................................12

3.3 Locomotive ...........................................................................................................12

3.4 Commercial Marine ...............................................................................................13

**4.0 STATIONARY AREA AND POINT EMISSIONS ....................................................................14**

4.1 2011 Base Year Emissions .....................................................................................14

4.2 2027 Projected Year Emissions ..............................................................................14

4.2.1 Point Sources .....................................................................................................14

4.2.2 Area Sources ......................................................................................................15

**5.0 REFERENCES.....................................................................................................................16**

## APPENDICES

Appendix A. Parish and Source Category Breakout of Area Source Projection Categories and 2011-2027 Growth Factors

## TABLES

Table 1-1. Summary of Daily Emissions (tons/day) by Parish and Major Source Category for Calendar Year 2027. Mobile source emissions represent an average August day, stationary area and point emissions represent an average annual day. ..........................................................................2

Table 1-2. Summary of Daily On-road Emissions (tons/day) by Parish for Calendar Year 2022. Emissions represent an average August day.......................................3

Table 2-1. Vehicle miles traveled by Parish and HPMS Vehicle Class for 2022 and 2027. ....................................................................................................5

Table 2-2. Vehicle population by source type for the Baton Rouge Area in 2022 and 2027. ....6

Table 2-3. Inspection and Maintenance Programs in 5-parish Baton Rouge non-attainment area ....7

Table 2-4. Daily average area-wide emissions in tons per day for 2022 and 2027. ....9

Table 2-5. Daily average VOC emissions by Parish for Controlled Stage II refueling in tons per day for 2022 and 2027. ....11

## FIGURES

Figure 2-1. August average daily Baton Rouge 5-parish area-wide vehicle miles traveled by HPMS vehicle classes for 2022 and 2027. ....6

Figure 2-2. Hourly speed distribution profiles for East Baton Rouge and Iberville parishes by road type (2 - Rural Restricted Access, 3 - Rural Unrestricted Access, 4 - Urban Restricted Access and 5 - Urban Unrestricted Access). ....8

Figure 2-3. Daily VOC emissions for 2022 and 2027 by emissions process and location. ....10

Figure 2-4. Baton Rouge 5-parish area daily NOx and VOC emissions for 2010 and 2017 (ENVIRON and ERG, 2013); 2022 and 2027 (estimated in this work) by parish. ....11

## 1.0 INTRODUCTION

ENVIRON International Corporation (ENVIRON) and Eastern Research Group, Inc. (ERG) have developed future year emission inventory projections for the Baton Rouge Ozone Nonattainment Area. The nonattainment area comprises the five parishes of Ascension, East Baton Rouge, Iberville, Livingston and West Baton Rouge. A 2027 inventory consists of all anthropogenic source sectors emitting ozone precursors, including nitrogen oxides (NOx), volatile organic compounds (VOC), and carbon monoxide (CO). The 2027 year was developed to support the Louisiana Department of Environmental Quality (LDEQ) with their Baton Rouge ozone nonattainment redesignation request. An interim year 2022 emissions inventory was also developed that includes only on-road mobile sources for the same compounds. The 2022 inventory was developed to support the Capitol Region Planning Commission (CRPC) with their future conformity analyses.

EPA-accepted tools, datasets, and methodologies were applied to develop the 2027 and 2022 emission projections for the area. Each are described in the following sections: Section 2 describes the models and data used to estimate on-road mobile emissions; Section 3 describes the development of off-road mobile emissions; Section 4 describes the source of baseline (2011) stationary area and point source emissions, as well as data and methods by which to derive projection factors by individual source category.

Note that on-road mobile emissions were derived using the MOtor Vehicle Emission Simulator (MOVES2010b) run in “inventory” mode, supplied with local vehicle activity/age/fleet mix, fuel, and control program data. Although an initial version of MOVES2014 was available for this project, our testing of the model in combination with other circumstantial accounts from EPA indicated some remaining technical issues with the initial version. Based on this information, and the fact that EPA is allowing a two-year grace period on the use of MOVES2010b, the LDEQ and CRPC collectively agreed on the use of MOVES2010b for this project. The National Mobile Inventory Model (NMIM) was used to generate parish-level off-road equipment emissions estimates.

Table 1-1 presents a summary of NOx, VOC, and CO emissions for 2027 by parish and by major source category. Table 1-2 presents a similar summary for 2022 on-road mobile sources. More detailed future year emission estimates are provided in accompanying spreadsheets comprising the deliverables for the project.

**Table 1-1. Summary of Daily Emissions (tons/day) by Parish and Major Source Category for Calendar Year 2027. Mobile source emissions represent an average August day, stationary area and point emissions represent an average annual day.**

| FIPS | Parish | 2027 Daily Emissions (tons/day) | | |
|---|---|---|---|---|
| | | CO | NOX | VOC |
| **Point Source** | | | | |
| 22005 | Ascension Parish | 14.5 | 29.7 | 13.3 |
| 22033 | East Baton Rouge Parish | 32.9 | 31.3 | 24.5 |
| 22047 | Iberville Parish | 21.8 | 36.9 | 11.2 |
| 22063 | Livingston Parish | 1.2 | 0.3 | 1.3 |
| 22121 | West Baton Rouge Parish | 10.2 | 3.7 | 2.9 |
| ***Sub Total*** | ***5-Parish Area*** | ***80.6*** | ***101.9*** | ***53.2*** |
| **Area Source*** | | | | |
| 22005 | Ascension Parish | 12.1 | 4.0 | 53.3 |
| 22033 | East Baton Rouge Parish | 12.1 | 9.4 | 71.4 |
| 22047 | Iberville Parish | 21.4 | 3.9 | 66.0 |
| 22063 | Livingston Parish | 21.6 | 2.3 | 75.3 |
| 22121 | West Baton Rouge Parish | 9.8 | 2.5 | 23.2 |
| ***Sub Total*** | ***5-Parish Area*** | ***76.9*** | ***22.1*** | ***289.1*** |
| **Offroad Source** | | | | |
| 22005 | Ascension Parish | 10.2 | 2.7 | 0.6 |
| 22033 | East Baton Rouge Parish | 53.2 | 5.6 | 3.0 |
| 22047 | Iberville Parish | 6.0 | 4.0 | 0.5 |
| 22063 | Livingston Parish | 10.9 | 0.6 | 1.1 |
| 22121 | West Baton Rouge Parish | 9.5 | 2.3 | 0.9 |
| ***Sub Total*** | ***5-Parish Area*** | ***89.8*** | ***15.3*** | ***6.1*** |
| **On-road Source** | | | | |
| 22005 | Ascension Parish | 24.7 | 2.2 | 2.5 |
| 22033 | East Baton Rouge Parish | 53.9 | 4.6 | 5.0 |
| 22047 | Iberville Parish | 6.1 | 0.7 | 0.4 |
| 22063 | Livingston Parish | 27.5 | 2.6 | 3.1 |
| 22121 | West Baton Rouge Parish | 7.5 | 0.9 | 0.4 |
| ***Sub Total*** | ***5-Parish Area*** | ***119.8*** | ***11.0*** | ***11.4*** |
| **All Sources** | | | | |
| 22005 | Ascension Parish | 61.6 | 38.7 | 69.6 |
| 22033 | East Baton Rouge Parish | 152.0 | 50.9 | 103.9 |
| 22047 | Iberville Parish | 55.4 | 45.6 | 78.0 |
| 22063 | Livingston Parish | 61.2 | 5.7 | 80.8 |
| 22121 | West Baton Rouge Parish | 37.0 | 9.3 | 27.4 |
| ***Total*** | ***5-Parish Area*** | ***367.1*** | ***150.2*** | ***359.8*** |

* Includes refueling emissions

**Table 1-2. Summary of Daily On-road Emissions (tons/day) by Parish for Calendar Year 2022. Emissions represent an average August day.**

| FIPS | Parish | 2022 Daily Emissions (tons/day) | | |
|---|---|---|---|---|
| | | CO | NOX | VOC |
| **On-road Source** | | | | |
| 22005 | Ascension Parish | 24.8 | 2.6 | 2.6 |
| 22033 | East Baton Rouge Parish | 61.4 | 6.4 | 6.2 |
| 22047 | Iberville Parish | 7.4 | 1.1 | 0.5 |
| 22063 | Livingston Parish | 28.1 | 3.1 | 3.2 |
| 22121 | West Baton Rouge Parish | 8.4 | 1.1 | 0.5 |
| ***Total*** | ***5-Parish Area*** | ***130.2*** | ***14.4*** | ***13.0*** |

## 2.0 ON-ROAD MOBILE SOURCES

On-road mobile emissions are pollutants emitted from highway motor vehicles during driving operation and while parked. Driving emissions are released through vehicle exhaust and evaporative processes such as permeation and leaks. Parked emissions, also referred to as off-network, are associated with engine starts, and evaporative processes including diurnal vapor venting and hot soaks.

EPA's MOVES was used to estimate on-road emissions for the five-parish area of Baton Rouge for calendar years 2022 and 2027. The model and database version used for this work were MOVES2010b and MOVESdb20121030, respectively. The MOVES model was run in "inventory" mode for each of the five Baton Rouge parishes using the County Domain with local data inputs provided by state and regional agencies. Under this configuration, each run output consists of parish-wide emissions (in grams) for an average day in August. Emissions estimates are available by pollutant, process, and Source Classification Code (SCC) which details the road type, vehicle class and fuel type.

### 2.1 Model Inputs

Using parish-specific parameters generally yields more representative estimates of regional motor vehicle emissions (EPA, 2010). Important input data that shapes emissions outputs in the MOVES model include ambient temperature and humidity, fuel specifications, inspection and maintenance (I/M) programs, vehicle fleet age distribution, speeds distribution by road type, and estimates of vehicle-miles traveled (VMT) and vehicle population. Under the direction of LDEQ, the Louisiana Department of Transportation and Development (LDOTD) and the CRPC contributed local datasets necessary for the development of Baton Rouge on-road emission estimates, including:

- Average August day VMT by road type and parish for 2022 and 2027
- VMT estimates by vehicle type for each road type
- 2011 and 2017 Vehicle population by age for each parish and four source types:
    1. Motorcycle (source type 11)
    2. Passenger Car (source type 21)
    3. Passenger Truck (source type 31)
    4. Light Commercial Truck (source type 32)
- Hourly speed distribution by road type and by parish

A previous photochemical modeling study for the Baton Rouge nonattainment area and the rest of Louisiana (ENVIRON and ERG, 2013) included the development of base year (2010) and projected future year (2017) model-ready emissions of ozone precursors from on-road sources. Specific local on-road data from that study were applied in the present work to prepare required model inputs. MOVES inputs taken from previous work include fuel specifications, age distribution for heavy duty vehicles, I/M coverage information, VMT hourly temporal distribution, and 2017 VMT estimates (indirectly used to scale vehicle population).

CRPC provided August average day VMT by parish and road type for 2022 and 2027, which was derived from travel demand model (TransCAD) applications representing roadway network activity for the respective years. VMT was disaggregated to the 16 MOBILE6 vehicle types using the VMT fractions provided by CRPC, then subsequently processed with EPA's MOVES tools (EPA, 2014a) to convert into the 6 HPMS vehicle classes required for MOVES. The HPMS VMT is summarized in Table 2-1. The estimated VMT by HPMS vehicle class (Figure 2-1) indicates that passenger cars represent over 61% of the area-wide VMT, passenger and light commercial trucks represent about 32% of the VMT, with combined VMT contribution of 6% from buses and combination and single unit trucks.

**Table 2-1. Vehicle miles traveled by Parish and HPMS Vehicle Class for 2022 and 2027.**

| Year | HPMS Vtype | Daily Vehicle Miles Traveled | | | | | |
|---|---|---|---|---|---|---|---|
| | | Ascension | East Baton Rouge | Iberville | Livingston | West Baton Rouge | Area-wide |
| 2022 | Motorcycles | 65,530 | 148,734 | 14,299 | 54,443 | 14,031 | 297,036 |
| | Passenger Cars | 3,382,191 | 8,508,126 | 886,217 | 3,156,245 | 1,196,356 | 17,129,135 |
| | Passenger and Light Commercial Trucks | 1,793,762 | 4,179,220 | 598,003 | 1,807,246 | 737,113 | 9,115,343 |
| | Buses | 13,290 | 24,487 | 7,635 | 15,421 | 8,201 | 69,033 |
| | Single Unit Trucks | 79,090 | 145,923 | 46,463 | 93,644 | 47,886 | 413,005 |
| | Combination Trucks | 230,916 | 423,894 | 136,671 | 274,087 | 140,616 | 1,206,184 |
| **2022 Total** | | **5,564,779** | **13,430,383** | **1,689,287** | **5,401,085** | **2,144,203** | **28,229,737** |
| 2027 | Motorcycles | 75,841 | 146,921 | 13,740 | 62,885 | 14,287 | 313,673 |
| | Passenger Cars | 3,923,786 | 8,519,139 | 862,704 | 3,648,719 | 1,242,203 | 18,196,550 |
| | Passenger and Light Commercial Trucks | 2,077,912 | 4,185,273 | 581,633 | 2,086,853 | 765,057 | 9,696,727 |
| | Buses | 15,364 | 24,532 | 7,383 | 17,825 | 8,435 | 73,539 |
| | Single Unit Trucks | 91,545 | 145,884 | 44,914 | 108,226 | 49,246 | 439,815 |
| | Combination Trucks | 267,283 | 423,772 | 132,112 | 316,767 | 144,596 | 1,284,529 |
| **2027 Total** | | **6,451,730** | **13,445,520** | **1,642,486** | **6,241,274** | **2,223,824** | **30,004,834** |

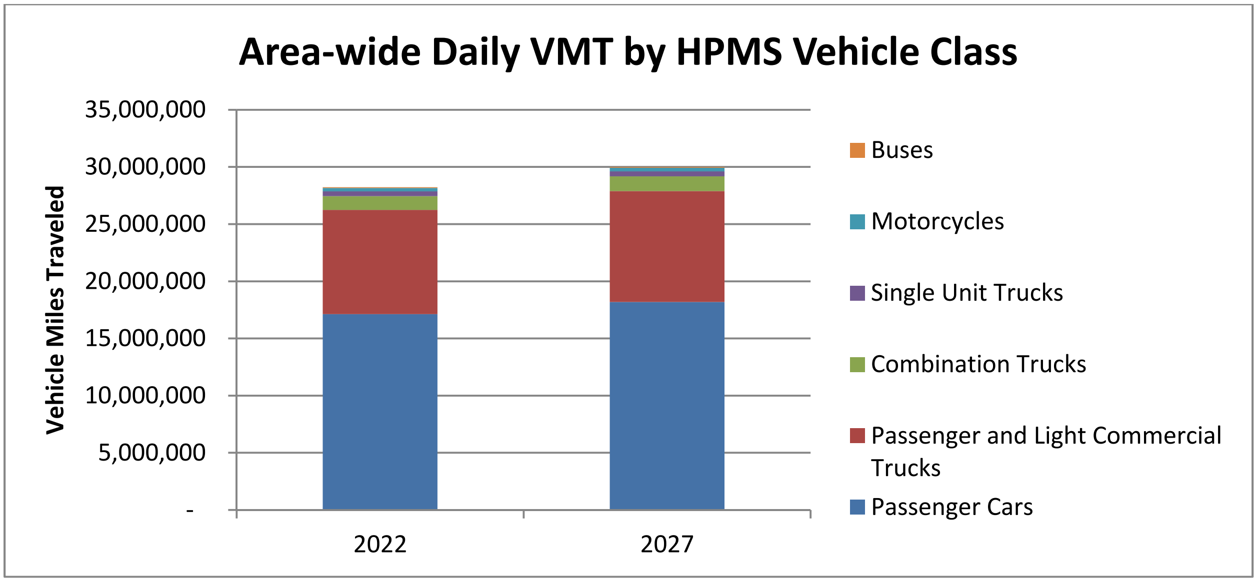


**Figure 2-1. August average daily Baton Rouge 5-parish area-wide vehicle miles traveled by HPMS vehicle classes for 2022 and 2027.**

Vehicle population by source type is an important local MOVES input given that it is used to calculate start and evaporative emissions. The 2011 and 2017 population data provided by parish included four of the 13 MOVES source types: motorcycle, passenger car, passenger truck, and light commercial truck. The light duty vehicle population for the five-parish area was scaled by source type to 2022 and 2027 by applying the ratio of 2017 population to 2017 VMT to the 2022 and 2027 VMT by source type. For the nine source types not included in the LDEQ dataset, we used MOVES2010b default annual mileage accumulation rates (miles/vehicle/year) by source type and 2022 and 2027 VMT estimates by source type to estimate the population. The population projections by source type are summarized in Table 2-2 below.

**Table 2-2. Vehicle population by source type for the Baton Rouge Area in 2022 and 2027.**

| Source type | 2022 Population | 2027 Population |
|---|---:|---:|
| Passenger Car | 466,417 | 493,316 |
| Passenger Truck | 294,547 | 316,820 |
| Motorcycle | 147,864 | 160,266 |
| Light Commercial Truck | 91,636 | 98,550 |
| Single Unit Short-haul Truck | 8,787 | 9,338 |
| Combination Short-haul Truck | 5,856 | 5,896 |
| Combination Long-haul Truck | 2,612 | 2,886 |
| Motor Home | 1,811 | 2,008 |
| School Bus | 1,266 | 1,352 |
| Single Unit Long-haul Truck | 616 | 647 |
| Refuse Truck | 253 | 268 |
| Transit Bus | 122 | 128 |
| Intercity Bus | 22 | 24 |

The parish-level age distributions for light duty vehicles (sources 11, 21, 31, 32) were derived from the 2011 vehicle registration data provided by LDEQ. The registration data included age distributions formatted for input to the MOBILE6 model; EPA's VMT converter tools were used to translate the age distribution to the appropriate source types for MOVES. Vehicle registration data provided by LDEQ covered only four out of 13 MOVES source types. Age distributions for the other nine source types by parish were taken from ENVIRON and ERG (2013).

Fuel formulations and I/M program specification were set by parish based on data provided by LDEQ (ENVIRON and ERG, 2013) and MOVES defaults. Gasoline Reid Vapor Pressure (RVP) for the 5-parish nonattainment area was set at 7.8 psi. All gasoline properties except RVP and diesel fuel properties were based on MOVES defaults, consistent with previous on-road emissions modeling for Baton Rouge (ENVIRON and ERG, 2013). In addition, LDEQ specified using 2005 I/M programs represented in Table 2-3. These I/M programs consist of annual testing requirements for passenger cars, passenger trucks and light commercial trucks that ultimately help reduce hydrocarbon, CO and NOx emissions.

**Table 2-3. Inspection and Maintenance Programs in 5-parish Baton Rouge non-attainment area .**

| IM Test Standard | Pollutants Affected | Model Years Covered | | Compliance Factor | | |
|---|---|---|---|---|---|---|
| | | Begin Model Year | End Model Year | Passenger Car | Passenger Truck | Light Commercial Truck |
| Evaporative Gas Cap Check | Total Gaseous Hydrocarbons | 1980 | 2027 | 96 | 93.12 | 89.28 |
| | Total Gaseous Hydrocarbons | 1980 | 2027 | 96 | 93.12 | 89.28 |
| Evaporative System OBD Check | Total Gaseous Hydrocarbons | 1980 | 2025 | 96 | 93.12 | 89.28 |
| | Total Gaseous Hydrocarbons | 1980 | 2025 | 96 | 93.12 | 89.28 |
| Exhaust OBD Check | Total Gaseous Hydrocarbons | 1996 | 2025 | 96 | 93.12 | 89.28 |
| | Total Gaseous Hydrocarbons | 1996 | 2025 | 96 | 93.12 | 89.28 |
| | CO | 1996 | 2025 | 96 | 93.12 | 89.28 |
| | CO | 1996 | 2025 | 96 | 93.12 | 89.28 |
| | NOx | 1996 | 2025 | 96 | 93.12 | 89.28 |
| | NOx | 1996 | 2025 | 96 | 93.12 | 89.28 |

Speed is another key determinant of emission rates. Hourly average-speed distributions were provided by CRPC for each MOVES road type (2 - Rural Restricted Access, 3 - Rural Unrestricted Access, 4 - Urban Restricted Access and 5 - Urban Unrestricted Access). A single profile was provided per road type; hence it was assumed that hourly speed profiles by road type were the same across all parishes and vehicle classes. Figure 2-2 shows the average speed distributions by hour of the day for the four MOVES road types, and for two of the five parishes in study.

East Baton Rouge (EBR) and Iberville were selected as examples for presentation based on their distinctive VMT distribution by road type and daily VMT, which accordingly affects hourly speeds. EBR has the largest VMT in the area and being more urban, highway speeds (road type 4) appear to be generally lower and peak down deeper during rush hour traffic (8AM, 5PM) than in the more rural Iberville.

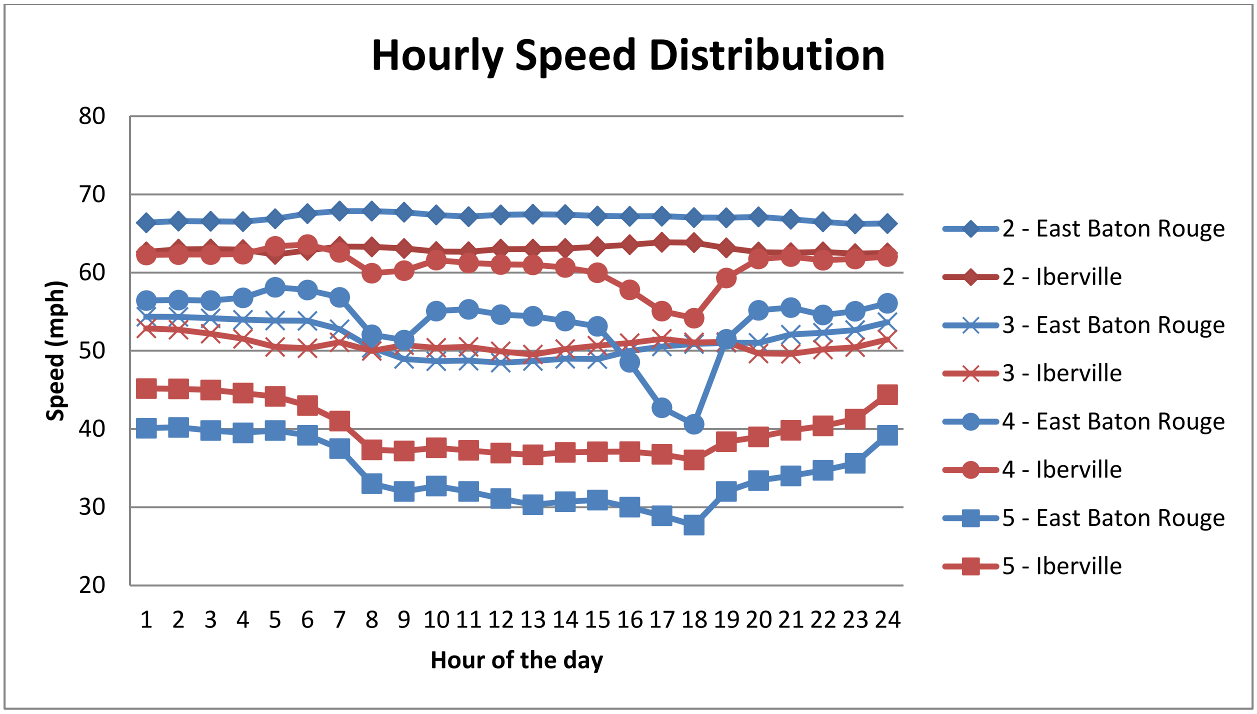


**Figure 2-2. Hourly speed distribution profiles for East Baton Rouge and Iberville parishes by road type (2 - Rural Restricted Access, 3 - Rural Unrestricted Access, 4 - Urban Restricted Access and 5 - Urban Unrestricted Access).**

Lastly, daily VMT was distributed to hours of the day through a temporal profile input (labeled hourvmtfraction) based on ENVIRON and ERG (2013).

After preparing all MOVES inputs, ten county-domain runs (5 parishes x 2 years) were set up and launched in MOVES2010b. The model runs output consisted of parish-level emissions for an average August day detailed by year, SCCs, 12 *Part5SCC* vehicle classes, 12 HPMS functional classes, pollutants, and process groups (evaporative, exhaust, tirewear and brakewear).

Thorough quality assurance checks were performed during the preparation of inputs and run specifications, as well as during the review of the resulting inventory. Checks for completeness and soundness of input data were performed by comparing the 2022 and 2027 inputs to inputs from ENVIRON and ERG (2013) and MOVES defaults. In addition, grams-per-mile emission rates by vehicle class were back calculated from the area-wide emissions and activity outputs, and compared with emission rates derived from equivalent-year-and-county runs with MOVES default inputs. Emission rates were within the same order of magnitude, and differences observed between emission rates for key pollutants (VOC, NOx) were correlated back to differences between input data used for each run such as I/M coverage, age distribution, and speed distributions.

## 2.2 On-road Emission Inventory Results

The area-wide daily emissions estimates by vehicle class are shown in Table 2-4; the largest contributor to emissions from each pollutant is displayed in red text. Results show that light duty gasoline trucks (LDGT1) and heavy duty diesel trucks (HHDDV) are the two largest sources of on-road NOx emissions in the area, while gasoline passenger cars (LDGV) and motorcycles (MC) are the two largest sources of on-road VOC emissions. These results are consistent with the large fraction of area-wide VMT that passenger cars and light duty trucks represent (~90%), shown in Figure 2-1. Despite the small fraction of total VMT that is from HHDDVs, HHDDVs are large contributors to emission because their engines typically generate NOx emissions at significantly higher rates (1.3-1.9 g/mile in this work) than light duty gasoline trucks (0.28-0.4 g/mile in this work). In addition, HHDDV are also known to idle for extended periods of time (known as hoteling), thus contributing to off-network emissions. Table 2-4 shows on-road emissions by vehicle type.

**Table 2-4. Daily average area-wide emissions in tons per day for 2022 and 2027.**

| YEAR | SCC | Vehicle Type | Area-wide Emissions (Tons per day) | | |
|---|---|---|---|---|---|
| | | | NOx | CO | VOC |
| 2022 | 2201001000 | LDGV | 3.020 | **52.446** | **3.845** |
| | 2201020000 | LDGT1 | **3.729** | 41.435 | 3.097 |
| | 2201040000 | LDGT2 | 1.921 | 21.345 | 1.595 |
| | 2201070000 | HDGV | 0.785 | 8.744 | 0.466 |
| | 2201080000 | MC | 0.159 | 3.177 | 3.676 |
| | 2230001000 | LDDV | 0.015 | 0.210 | 0.003 |
| | 2230060000 | LDDT | 0.165 | 0.219 | 0.015 |
| | 2230071000 | 2BHDDV | 0.077 | 0.103 | 0.007 |
| | 2230072000 | LHDDV | 0.374 | 0.495 | 0.035 |
| | 2230073000 | MHDDV | 0.717 | 0.471 | 0.043 |
| | 2230074000 | HHDDV | 3.232 | 1.400 | 0.218 |
| | 2230075000 | BUSES | 0.171 | 0.114 | 0.012 |
| | **Grand Total** | | **14.37** | **130.16** | **13.01** |
| 2027 | 2201001000 | LDGV | 2.375 | **50.976** | 3.484 |
| | 2201020000 | LDGT1 | **2.640** | 36.147 | 2.258 |
| | 2201040000 | LDGT2 | 1.360 | 18.621 | 1.163 |
| | 2201070000 | HDGV | 0.644 | 7.991 | 0.350 |
| | 2201080000 | MC | 0.161 | 3.183 | **3.865** |
| | 2230001000 | LDDV | 0.011 | 0.260 | 0.004 |
| | 2230060000 | LDDT | 0.138 | 0.228 | 0.011 |
| | 2230071000 | 2BHDDV | 0.064 | 0.107 | 0.005 |
| | 2230072000 | LHDDV | 0.304 | 0.504 | 0.024 |
| | 2230073000 | MHDDV | 0.541 | 0.428 | 0.029 |
| | 2230074000 | HHDDV | 2.608 | 1.254 | 0.183 |
| | 2230075000 | BUSES | 0.106 | 0.096 | 0.007 |
| | **Grand Total** | | **10.95** | **119.80** | **11.38** |

Much of the on-road VOC emissions are generated off-network, that is, while vehicles are parked. These off-network emissions are produced from engine starts or through vapor permeation, fuel leaks and diurnal and/or hot soak vapor venting. VOC emissions generated on roads are produced through combustion or released through permeation and leaks. Figure 2-3 shows hydrocarbon emissions by process and by location (off-network versus on roads). Inventory results show that about 80% of total VOC emissions in each analysis year occur while vehicles are parked.

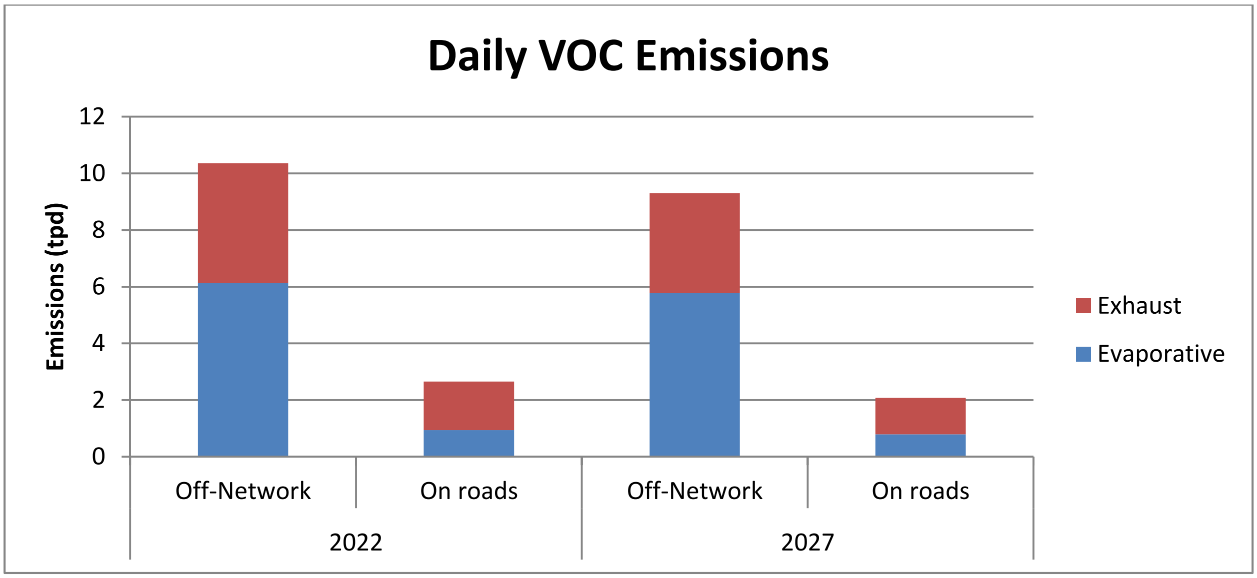


**Figure 2-3. Daily VOC emissions for 2022 and 2027 by emissions process and location.**

Emissions for 2010 and 2017 (ENVIRON and ERG, 2013) were compared with estimates developed for 2022 and 2027. Figure 2-4 shows emissions for 2010, 2017, 2022, and 2027 by parish. Despite the forecasted monotonic increase in VMT from 2010 to 2027, NOX and TOG emissions are estimated to decrease monotonically over the same period due to fleet turnover to newer vehicles in future years.

## 2.3 Stage II Refueling Emissions

The two types of Stage II refueling emissions included in MOVES are vapor displacement and spills. MOVES includes default parish-level Stage II control efficiencies and separates the Stage II control efficiency into two factors, a refueling vapor adjustment factor, and a spillage adjustment factor, which are measures of the efficiency of the Stage II program at reducing vapor displacement and spillage. MOVES2010b default adjustment factors for the Baton Rouge 5-parish area were applied to the calculations, as indicated by LDEQ. The default control factor for refueling vapor losses is 95%, whereas the control factor for spillage losses is 50%. Controlled Stage II refueling emissions of VOC for the Baton Rouge parishes for 2022 and 2027 are summarized in Table 2-5. Controlled refueling emissions represent about 1.5% of the total VOC on-road emissions inventory estimated in this work.

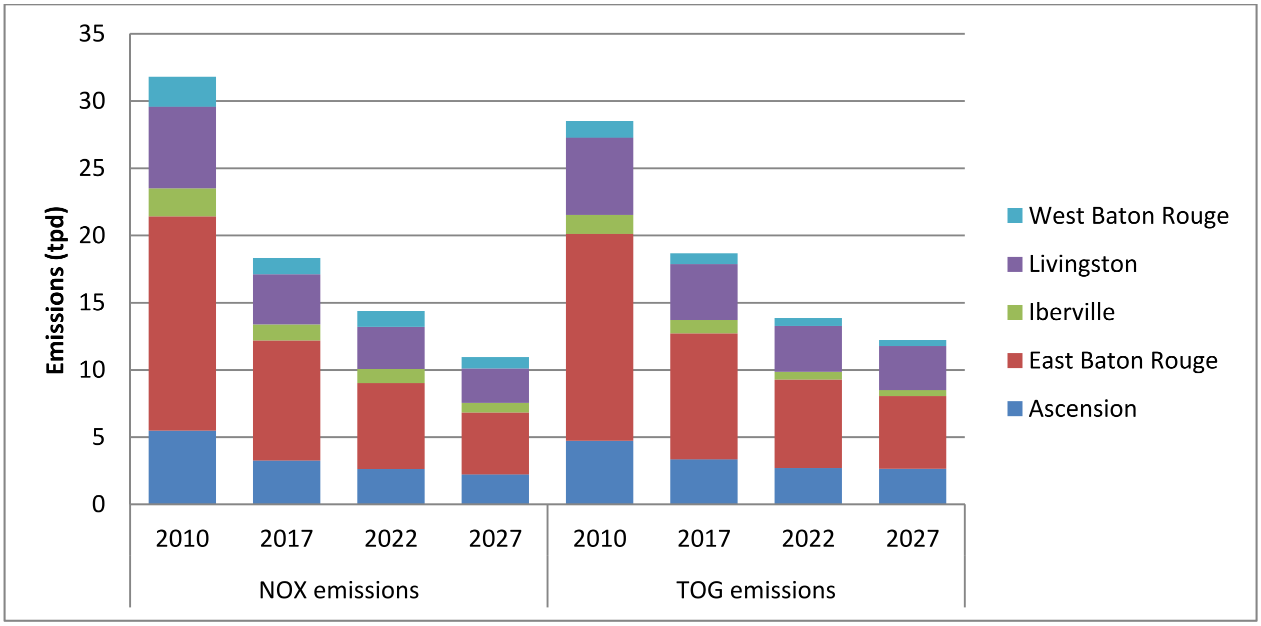


**Figure 2-4. Baton Rouge 5-parish area daily NOx and VOC emissions for 2010 and 2017 (ENVIRON and ERG, 2013); 2022 and 2027 (estimated in this work) by parish.**

**Table 2-5. Daily average VOC emissions by Parish for Controlled Stage II refueling in tons per day for 2022 and 2027.**

| Parish | SCC | Process | VOC (tpd) 2022 | 2027 |
|---|---|---|---|---|
| Ascension | 2501060102 | Refueling Displacement Vapor Loss | 0.004 | 0.003 |
| Ascension | 2501060103 | Refueling Spillage Loss | 0.030 | 0.032 |
| East Baton Rouge | 2501060102 | Refueling Displacement Vapor Loss | 0.009 | 0.007 |
| East Baton Rouge | 2501060103 | Refueling Spillage Loss | 0.074 | 0.067 |
| Iberville | 2501060102 | Refueling Displacement Vapor Loss | 0.001 | 0.001 |
| Iberville | 2501060103 | Refueling Spillage Loss | 0.012 | 0.010 |
| Livingston | 2501060102 | Refueling Displacement Vapor Loss | 0.004 | 0.003 |
| Livingston | 2501060103 | Refueling Spillage Loss | 0.032 | 0.034 |
| West Baton Rouge | 2501060102 | Refueling Displacement Vapor Loss | 0.002 | 0.001 |
| West Baton Rouge | 2501060103 | Refueling Spillage Loss | 0.014 | 0.013 |
| **TOTAL** | | | **0.182** | **0.171** |

# 3.0 OFF-ROAD MOBILE SOURCES

## 3.1 NONROAD Equipment

The EPA's National Mobile Inventory Model (NMIM) was used to generate Louisiana parish-level off-road equipment emissions estimates for August 2027 in the Baton Rouge 5-parish area. NMIM is a tool for estimating non-road emissions by county for the entire US to support National Emission Inventory Updates (NEI) updates. For this modeling effort NMIM version NMIM20090504 was run with county database NCD20090531. Emissions are estimated from off-road equipment in the following categories:

- Agricultural equipment, such as tractors, combines, and balers;
- Airport ground support, such as terminal tractors and supply vehicles;
- Construction equipment, such as graders and back hoes;
- Industrial and commercial equipment, such as fork lifts and sweepers;
- Residential and commercial lawn and garden equipment, such as leaf blowers;
- Logging equipment, such as shredders and large chain saws;
- Recreational equipment, such as off-road motorbikes and ATVs; and
- Recreational marine vessels, such as power boats.

Local data were used for gasoline fuel parameters, consistent with the on-road mobile inventory (Section 2.0). All non-gasoline equipment fuel properties were default parameters.

## 3.2 Aircraft

Aircraft emissions for the Baton Rouge 5-parish area were forecasted to 2027 from EPA 2011 NEI based on methodology similar to the methodology used by EPA to forecast the 2011 NEI estimates to 2018 (EPA, 2014c). Growth in aircraft activity was estimated based on aircraft operations data extracted from the Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) database (http://aspm.faa.gov/apowtaf/). For airports with aircraft operations data available from the FAA TAF, growth forecasts were estimated based on the ratio of 2027 to 2011 operations by aircraft type (i.e. commercial, air taxi, general aviation, and military) for each individual airport. For smaller airports where airport specific data was not available from the FAA TAF database, growth forecasts were estimated based on the ratio of 2027 to 2011 operations by aircraft type state-wide. Similar to EPA forecasts, no additional emissions control was assumed for aircraft after 2011.

## 3.3 Locomotive

Locomotive emissions for the Baton Rouge 5-parish area were forecasted to 2027 from the EPA 2011 NEI based on methodology similar to the methodology used by EPA to forecast the 2011 NEI estimates to 2018 (EPA, 2014c) accounting for both activity growth and emissions control due to turnover of the fleet to cleaner engines over time. EPA 2008 Regulatory Impact Analysis (RIA) (EPA, 2009a) estimates of the ratio of nationwide 2027 to 2011 locomotive emissions were applied to 2011 NEI locomotive emission estimates to estimate emissions in 2027.

## 3.4 Commercial Marine

Commercial marine category 1 and category 2 engine emissions (compression-ignition engines below 30 liters per cylinder) for the Baton Rouge 5-parish area were forecasted to 2027 from the EPA 2011 NEI based on methodology similar to the methodology used by EPA to forecast the 2011 NEI estimates to 2018 (EPA, 2014c) accounting for both activity growth and emissions control due to turnover of the fleet to cleaner engines over time. The EPA 2008 Regulatory Impact Analysis (RIA) (EPA, 2009a) estimates of the ratio of nationwide 2027 to 2011 category 1 and category 2 marine emissions were applied to 2011 NEI emission estimates to estimate emissions in 2027.

Commercial marine category 3 engine emissions (compression-ignition engines at or above 30 liters per cylinder) for the Baton Rouge 5-parish area were forecasted to 2027 from the EPA 2011 NEI based on methodology similar to the methodology used by EPA to forecast the 2011 NEI estimates to 2018 (EPA, 2014c) accounting for both activity growth as well as control due to fleet turnover and reductions in fuel sulfur content. The EPA final rule RIA for category 3 engines (EPA, 2009b) estimates of activity growth and emission control for the Gulf Coast were applied to 2011 NEI emissions to estimate 2027 emissions.

# 4.0 STATIONARY AREA AND POINT EMISSIONS

## 4.1 2011 Base Year Emissions

The 2011 point and area source emissions for the 5-parish Baton Rouge nonattainment area were obtained from the EPA 2011 National Emissions Inventory (NEI), Version 2 (EPA, 2014b). This version of the 2011 NEI was released on December 12, 2014 and ERG downloaded the files on December 16, 2014. One exception to this was that Stage II emissions were not included in the 2011 NEI, Version 2 files; ENVIRON gap-filled the missing Stage II emissions using output from the MOVES model runs for on-road motor vehicles. All emissions related to aircraft, railroads, and commercial marine vessels were also removed from the 2011 base year point and area source files.

## 4.2 2027 Projected Year Emissions

### 4.2.1 Point Sources

The base year 2011 point source emissions inventory was projected to 2027 based upon information from the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) (EIA, 2014). Specific projection factor assignments were made based upon Source Classification Codes (SCCs) and North American Industry Classification System (NAICS) codes.

Electric power projections from the AEO for the SERC Delta electricity market module region (i.e., portions of Arkansas, Louisiana, Mississippi, and Texas) were used to develop projection factors for the electricity generation units (EGUs) in the 5-parish Baton Rouge nonattainment area. The projections did not include effects from the proposed Clean Power Plan (EPA, 2014d). Since the EGUs in the nonattainment area were all natural gas, only the natural gas-fired electric power projections were used.

On-shore oil and gas production projections from AEO were used to develop projection factors for point source oil and gas sources. The AEO Oil and gas production projections were published at the oil and gas supply model region; projections data for the Gulf Coast oil and gas supply model region (i.e., Alabama, Florida, Louisiana, Mississippi, and portions of Texas) were used.

National sector-level energy consumption projections from the 2014 AEO were used to develop the remaining point source projection factors. Total energy consumption projections data for the following industry sectors were used:

- Refining industry (refining activity only)
- Chemical industry (total feedstocks)
- Food industry (total energy)
- Paper industry (total energy)
- Metal durables industry (fabricated metals products and transportation equipment)
- Aluminum industry (total energy)

- Other industry (plastics and miscellaneous)

### 4.2.2 Area Sources

The base year 2011 area source emissions inventory was also projected to 2027 using projection factors based upon surrogates, including: population, energy consumption, oil and gas production, and vehicle miles travelled (VMT). Projection factor assignments were made at the SCC-level.

Parish-level population projections were used to develop population-based growth factors (Blanchard, 2014). These latest projections accounted for the lingering population shifts due to Hurricanes Katrina and Rita in 2005. Because the population projections were only developed for every 5 years (i.e., 2005, 2010, 2015, 2020, 2025, and 2030), linear interpolation was used to develop population values for the 2011 base year and the 2027 projection year. As recommended by the documentation for the population projections, the "Middle Series" population scenario was used. The population projection factors were greater than 1 for Ascension and Livingston parishes, while the population projection factors were less than 1 for East Baton Rouge, Iberville, and West Baton Rouge parishes.

Sector-level energy consumption projections from the 2014 AEO were used develop many area source projection factors (EIA, 2014). The AEO consumption projections data were published at the census division-level; projections data for the West South Central census division (i.e., Arkansas, Louisiana, Oklahoma, and Texas) were used. Consumption projections data for the following sectors and fuel types were used:

- Industrial sector – coal, distillate, kerosene, other petroleum, propane, renewable, residual, and total;
- Commercial sector – kerosene, natural gas, propane, and renewable;
- Residential sector – distillate, kerosene, natural gas, and propane; and
- Transportation sector – other petroleum.

As with the point sources, AEO on-shore oil and gas production projections were also used to develop projection factors for oil and gas area sources.

Projections of VMT were also used to develop projection factors. These VMT projections were developed by ENVIRON in support of the on-road motor vehicle projections (Section 2). Projection factors were developed for each of the 5 parishes in the nonattainment area, as well as for the nonattainment area as a whole.

Finally, in addition to the projection factors described above, an "unchanged" factor (i.e., a value of 1.0) was applied to a few area source categories where it was felt that future year emissions would likely be unchanged.

Appendix A provides a complete list of area source projection categories and related 2011-2027 factors by source category code and by parish.

## 5.0 REFERENCES


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# APPENDIX A

## Parish and Source Category Breakout of Area Source Projection Categories and 2011-2027 Growth Factors

## Table A-1. Parish and Source Category Breakout of Area Source Projection Categories and 2011-2027 Growth Factors.

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| All | 2102002000 | Industrial Coal Combustion | Industrial - Coal | 1.1109 |
| All | 2102004001 | Industrial Distillate Combustion - Boilers | Industrial - Distillate | 1.1457 |
| All | 2102004002 | Industrial Distillate Combustion - IC Engines | Industrial - Distillate | 1.1457 |
| All | 2102005000 | Industrial Residual Combustion | Industrial - Residual | 1.2222 |
| All | 2102007000 | Industrial LPG Combustion | Industrial - Propane | 1.3330 |
| All | 2102008000 | Industrial Wood Combustion | Industrial - Renewable | 1.2377 |
| All | 2102011000 | Industrial Kerosene Combustion | Industrial - Kerosene | 1.1457 |
| All | 2103006000 | Commercial/Institutional Natural Gas Combustion | Commercial - Natural Gas | 1.0112 |
| All | 2103007000 | Commercial/Institutional LPG Combustion | Commercial - Propane | 1.2147 |
| All | 2103008000 | Commercial/Institutional Wood Combustion | Commercial - Renewable | 0.9867 |
| All | 2103011000 | Commercial/Institutional Kerosene Combustion | Commercial - Kerosene | 1.0769 |
| All | 2104004000 | Residential Distillate Combustion | Residential - Distillate | 0.9375 |
| All | 2104006000 | Residential Natural Gas Combustion | Residential - Natural Gas | 0.9253 |
| All | 2104007000 | Residential LPG Combustion | Residential - Propane | 0.7002 |
| Ascension | 2104008100 | Residential Wood Combustion - Fireplaces | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008100 | Residential Wood Combustion - Fireplaces | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008100 | Residential Wood Combustion - Fireplaces | Population - Iberville | 0.8392 |
| Livingston | 2104008100 | Residential Wood Combustion - Fireplaces | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008100 | Residential Wood Combustion - Fireplaces | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008210 | Residential Wood Combustion - Fireplace Inserts - Non-EPA Certified | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008210 | Residential Wood Combustion - Fireplace Inserts - Non-EPA Certified | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008210 | Residential Wood Combustion - Fireplace Inserts - Non-EPA Certified | Population - Iberville | 0.8392 |
| Livingston | 2104008210 | Residential Wood Combustion - Fireplace Inserts - Non-EPA Certified | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008210 | Residential Wood Combustion - Fireplace Inserts - Non-EPA Certified | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008220 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Non-catalytic | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008220 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Non-catalytic | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008220 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Non-catalytic | Population - Iberville | 0.8392 |
| Livingston | 2104008220 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Non-catalytic | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008220 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Non-catalytic | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008230 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Catalytic | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008230 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Catalytic | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008230 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Catalytic | Population - Iberville | 0.8392 |
| Livingston | 2104008230 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Catalytic | Population - Livingston | 1.6621 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| West Baton Rouge | 2104008230 | Residential Wood Combustion - Fireplace Inserts - EPA Certified - Catalytic | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008320 | Residential Wood Combustion - Woodstoves - EPA Certified - Non-catalytic | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008320 | Residential Wood Combustion - Woodstoves - EPA Certified - Non-catalytic | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008320 | Residential Wood Combustion - Woodstoves - EPA Certified - Non-catalytic | Population - Iberville | 0.8392 |
| Livingston | 2104008320 | Residential Wood Combustion - Woodstoves - EPA Certified - Non-catalytic | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008320 | Residential Wood Combustion - Woodstoves - EPA Certified - Non-catalytic | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008330 | Residential Wood Combustion - Woodstoves - EPA Certified - Catalytic | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008330 | Residential Wood Combustion - Woodstoves - EPA Certified - Catalytic | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008330 | Residential Wood Combustion - Woodstoves - EPA Certified - Catalytic | Population - Iberville | 0.8392 |
| Livingston | 2104008330 | Residential Wood Combustion - Woodstoves - EPA Certified - Catalytic | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008330 | Residential Wood Combustion - Woodstoves - EPA Certified - Catalytic | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008400 | Residential Wood Combustion - Pellet Stoves | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008400 | Residential Wood Combustion - Pellet Stoves | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008400 | Residential Wood Combustion - Pellet Stoves | Population - Iberville | 0.8392 |
| Livingston | 2104008400 | Residential Wood Combustion - Pellet Stoves | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008400 | Residential Wood Combustion - Pellet Stoves | Population - West Baton Rouge | 0.9447 |
| Iberville | 2104008610 | Residential Wood Combustion - Hydronic Heaters | Population - Iberville | 0.8392 |
| Livingston | 2104008610 | Residential Wood Combustion - Hydronic Heaters | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008610 | Residential Wood Combustion - Hydronic Heaters | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104008700 | Residential Wood Combustion - Other (Fire-pits, chimeas, etc.) | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104008700 | Residential Wood Combustion - Other (Fire-pits, chimeas, etc.) | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104008700 | Residential Wood Combustion - Other (Fire-pits, chimeas, etc.) | Population - Iberville | 0.8392 |
| Livingston | 2104008700 | Residential Wood Combustion - Other (Fire-pits, chimeas, etc.) | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104008700 | Residential Wood Combustion - Other (Fire-pits, chimeas, etc.) | Population - West Baton Rouge | 0.9447 |
| Ascension | 2104009000 | Residential Wood Combustion - Firelogs | Population - Ascension | 1.6055 |
| East Baton Rouge | 2104009000 | Residential Wood Combustion - Firelogs | Population - East Baton Rouge | 0.9775 |
| Iberville | 2104009000 | Residential Wood Combustion - Firelogs | Population - Iberville | 0.8392 |
| Livingston | 2104009000 | Residential Wood Combustion - Firelogs | Population - Livingston | 1.6621 |
| West Baton Rouge | 2104009000 | Residential Wood Combustion - Firelogs | Population - West Baton Rouge | 0.9447 |
| All | 2104011000 | Residential Kerosene Combustion | Residential - Kerosene | 0.2000 |
| All | 2301030000 | Pharmaceutical Manufacturing - Process Emissions | Unchanged | 1.0000 |
| Ascension | 2302002100 | Commercial Cooking - Conveyorized Charbroiling | Population - Ascension | 1.6055 |
| East Baton Rouge | 2302002100 | Commercial Cooking - Conveyorized Charbroiling | Population - East Baton Rouge | 0.9775 |
| Iberville | 2302002100 | Commercial Cooking - Conveyorized Charbroiling | Population - Iberville | 0.8392 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| Livingston | 2302002100 | Commercial Cooking - Conveyorized Charbroiling | Population - Livingston | 1.6621 |
| West Baton Rouge | 2302002100 | Commercial Cooking - Conveyorized Charbroiling | Population - West Baton Rouge | 0.9447 |
| Ascension | 2302002200 | Commercial Cooking - Under-fired Charbroiling | Population - Ascension | 1.6055 |
| East Baton Rouge | 2302002200 | Commercial Cooking - Under-fired Charbroiling | Population - East Baton Rouge | 0.9775 |
| Iberville | 2302002200 | Commercial Cooking - Under-fired Charbroiling | Population - Iberville | 0.8392 |
| Livingston | 2302002200 | Commercial Cooking - Under-fired Charbroiling | Population - Livingston | 1.6621 |
| West Baton Rouge | 2302002200 | Commercial Cooking - Under-fired Charbroiling | Population - West Baton Rouge | 0.9447 |
| Ascension | 2302003000 | Commercial Cooking - Deep Fat Frying | Population - Ascension | 1.6055 |
| East Baton Rouge | 2302003000 | Commercial Cooking - Deep Fat Frying | Population - East Baton Rouge | 0.9775 |
| Iberville | 2302003000 | Commercial Cooking - Deep Fat Frying | Population - Iberville | 0.8392 |
| Livingston | 2302003000 | Commercial Cooking - Deep Fat Frying | Population - Livingston | 1.6621 |
| West Baton Rouge | 2302003000 | Commercial Cooking - Deep Fat Frying | Population - West Baton Rouge | 0.9447 |
| Ascension | 2302003100 | Commercial Cooking - Flat Griddle Frying | Population - Ascension | 1.6055 |
| East Baton Rouge | 2302003100 | Commercial Cooking - Flat Griddle Frying | Population - East Baton Rouge | 0.9775 |
| Iberville | 2302003100 | Commercial Cooking - Flat Griddle Frying | Population - Iberville | 0.8392 |
| Livingston | 2302003100 | Commercial Cooking - Flat Griddle Frying | Population - Livingston | 1.6621 |
| West Baton Rouge | 2302003100 | Commercial Cooking - Flat Griddle Frying | Population - West Baton Rouge | 0.9447 |
| Ascension | 2302003200 | Commercial Cooking - Clamshell Griddle Frying | Population - Ascension | 1.6055 |
| East Baton Rouge | 2302003200 | Commercial Cooking - Clamshell Griddle Frying | Population - East Baton Rouge | 0.9775 |
| Iberville | 2302003200 | Commercial Cooking - Clamshell Griddle Frying | Population - Iberville | 0.8392 |
| Livingston | 2302003200 | Commercial Cooking - Clamshell Griddle Frying | Population - Livingston | 1.6621 |
| West Baton Rouge | 2302003200 | Commercial Cooking - Clamshell Griddle Frying | Population - West Baton Rouge | 0.9447 |
| All | 2310000220 | Oil & Gas Exploration & Production - Drill Rigs | Oil - On-Shore | 3.0449 |
| All | 2310000330 | Oil & Gas Exploration & Production - Artificial Lift | Oil - On-Shore | 3.0449 |
| All | 2310000550 | Oil & Gas Exploration & Production - Produced Water | Oil - On-Shore | 3.0449 |
| All | 2310000660 | Oil & Gas Exploration & Production - Hydraulic Fracturing | Oil - On-Shore | 3.0449 |
| All | 2310010100 | Oil & Gas Exploration & Production - Oil Well Heaters | Oil - On-Shore | 3.0449 |
| All | 2310010200 | Oil & Gas Exploration & Production - Oil Well Tanks | Oil - On-Shore | 3.0449 |
| All | 2310010300 | Oil & Gas Exploration & Production - Oil Well Pneumatic Devices | Oil - On-Shore | 3.0449 |
| All | 2310011000 | On-Shore Oil Production - All Processes | Oil - On-Shore | 3.0449 |
| All | 2310011201 | On-Shore Oil Production - Tank Truck and Railcare Loading - Crude Oil | Oil - On-Shore | 3.0449 |
| All | 2310011501 | On-Shore Oil Production - Fugitives - Connectors | Oil - On-Shore | 3.0449 |
| All | 2310011502 | On-Shore Oil Production - Fugitives - Flanges | Oil - On-Shore | 3.0449 |
| All | 2310011503 | On-Shore Oil Production - Fugitives - Open Ended Lines | Oil - On-Shore | 3.0449 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| All | 2310011505 | On-Shore Oil Production - Fugitives - Valves | Oil - On-Shore | 3.0449 |
| All | 2310021010 | On-Shore Gas Production - Storage Tanks - Condensate | Natural Gas - On-Shore | 1.7035 |
| All | 2310021030 | On-Shore Gas Production - Tank Truck and Railcar Loading - Condensate | Natural Gas - On-Shore | 1.7035 |
| All | 2310021100 | On-Shore Gas Production - Storage Tanks - Gas Well Heaters | Natural Gas - On-Shore | 1.7035 |
| All | 2310021202 | On-Shore Gas Production - 4Cycle Compressors (50-499 hp) - Lean Burn | Natural Gas - On-Shore | 1.7035 |
| All | 2310021251 | On-Shore Gas Production - 4Cycle Lateral Compressors - Lean Burn | Natural Gas - On-Shore | 1.7035 |
| All | 2310021300 | On-Shore Gas Production - Gas Well Pneumatic Devices | Natural Gas - On-Shore | 1.7035 |
| All | 2310021302 | On-Shore Gas Production - 4Cycle Compressors (50-499 hp) - Rich Burn | Natural Gas - On-Shore | 1.7035 |
| All | 2310021351 | On-Shore Gas Production - 4Cycle Lateral Compressors - Rich Burn | Natural Gas - On-Shore | 1.7035 |
| All | 2310021400 | On-Shore Gas Production - Gas Well Dehydrators | Natural Gas - On-Shore | 1.7035 |
| All | 2310021501 | On-Shore Gas Production - Fugitives - Connectors | Natural Gas - On-Shore | 1.7035 |
| All | 2310021502 | On-Shore Gas Production - Fugitives - Flanges | Natural Gas - On-Shore | 1.7035 |
| All | 2310021503 | On-Shore Gas Production - Fugitives - Open Ended Lines | Natural Gas - On-Shore | 1.7035 |
| All | 2310021505 | On-Shore Gas Production - Fugitives - Valves | Natural Gas - On-Shore | 1.7035 |
| All | 2310021506 | On-Shore Gas Production - Fugitives - Other | Natural Gas - On-Shore | 1.7035 |
| All | 2310021603 | On-Shore Gas Production - Gas Well Venting - Blowdowns | Natural Gas - On-Shore | 1.7035 |
| All | 2310111100 | On-Shore Oil Exploration - Mud Degassing | Oil - On-Shore | 3.0449 |
| All | 2310111401 | On-Shore Oil Exploration - Oil Well Pneumatic Pumps | Oil - On-Shore | 3.0449 |
| All | 2310111700 | On-Shore Oil Exploration - Oil Well Completions | Oil - On-Shore | 3.0449 |
| All | 2310121100 | On-Shore Gas Exploration - Mud Degassing | Natural Gas - On-Shore | 1.7035 |
| All | 2310121401 | On-Shore Gas Exploration - Gas Well Pneumatic Pumps | Natural Gas - On-Shore | 1.7035 |
| All | 2310121700 | On-Shore Gas Exploration - Gas Well Completions | Natural Gas - On-Shore | 1.7035 |
| Ascension | 2401001000 | Surface Coating - Architectural Coatings | Population - Ascension | 1.6055 |
| East Baton Rouge | 2401001000 | Surface Coating - Architectural Coatings | Population - East Baton Rouge | 0.9775 |
| Iberville | 2401001000 | Surface Coating - Architectural Coatings | Population - Iberville | 0.8392 |
| Livingston | 2401001000 | Surface Coating - Architectural Coatings | Population - Livingston | 1.6621 |
| West Baton Rouge | 2401001000 | Surface Coating - Architectural Coatings | Population - West Baton Rouge | 0.9447 |
| All | 2401005000 | Surface Coating - Auto Refinishing | Industrial - Total | 1.2615 |
| Ascension | 2401008000 | Surface Coating - Traffic Markings | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2401008000 | Surface Coating - Traffic Markings | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2401008000 | Surface Coating - Traffic Markings | VMT - Iberville | 1.5229 |
| Livingston | 2401008000 | Surface Coating - Traffic Markings | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2401008000 | Surface Coating - Traffic Markings | VMT - West Baton Rouge | 1.8135 |
| All | 2401015000 | Surface Coating - Factory Finish Wood | Industrial - Total | 1.2615 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| All | 2401020000 | Surface Coating - Wood Furniture | Industrial - Total | 1.2615 |
| All | 2401040000 | Surface Coating - Metal Cans | Industrial - Total | 1.2615 |
| All | 2401055000 | Surface Coating - Machinery & Equipment | Industrial - Total | 1.2615 |
| All | 2401065000 | Surface Coating - Electronic & Other Electrical | Industrial - Total | 1.2615 |
| All | 2401070000 | Surface Coating - Motor Vehicles | Industrial - Total | 1.2615 |
| All | 2401080000 | Surface Coating - Marine | Industrial - Total | 1.2615 |
| All | 2401090000 | Surface Coating - Miscellaneous Manufacturing | Industrial - Total | 1.2615 |
| All | 2401100000 | Surface Coating - Industrial Maintenance Coatings | Industrial - Total | 1.2615 |
| All | 2401200000 | Surface Coating - Other Special Purpose Coatings | Industrial - Total | 1.2615 |
| All | 2415000000 | Degreasing | Industrial - Total | 1.2615 |
| Ascension | 2420000000 | Dry Cleaning | Population - Ascension | 1.6055 |
| East Baton Rouge | 2420000000 | Dry Cleaning | Population - East Baton Rouge | 0.9775 |
| Iberville | 2420000000 | Dry Cleaning | Population - Iberville | 0.8392 |
| Livingston | 2420000000 | Dry Cleaning | Population - Livingston | 1.6621 |
| Ascension | 2425000000 | Graphic Arts | Population - Ascension | 1.6055 |
| East Baton Rouge | 2425000000 | Graphic Arts | Population - East Baton Rouge | 0.9775 |
| Iberville | 2425000000 | Graphic Arts | Population - Iberville | 0.8392 |
| Livingston | 2425000000 | Graphic Arts | Population - Livingston | 1.6621 |
| All | 2430000000 | Rubber/Plastics - All Processes | Industrial - Total | 1.2615 |
| All | 2440000000 | Miscellaneous Industrial - All Processes | Industrial - Total | 1.2615 |
| All | 2440020000 | Miscellaneous Industrial - Adhesive Application | Industrial - Total | 1.2615 |
| Ascension | 2460200000 | Consumer & Commercial Solvents - All Household | Population - Ascension | 1.6055 |
| East Baton Rouge | 2460200000 | Consumer & Commercial Solvents - All Household | Population - East Baton Rouge | 0.9775 |
| Iberville | 2460200000 | Consumer & Commercial Solvents - All Household | Population - Iberville | 0.8392 |
| Livingston | 2460200000 | Consumer & Commercial Solvents - All Household | Population - Livingston | 1.6621 |
| West Baton Rouge | 2460200000 | Consumer & Commercial Solvents - All Household | Population - West Baton Rouge | 0.9447 |
| Ascension | 2460500000 | Consumer & Commercial Solvents - Coating & Related Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2460500000 | Consumer & Commercial Solvents - Coating & Related Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2460500000 | Consumer & Commercial Solvents - Coating & Related Products | Population - Iberville | 0.8392 |
| Livingston | 2460500000 | Consumer & Commercial Solvents - Coating & Related Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2460500000 | Consumer & Commercial Solvents - Coating & Related Products | Population - West Baton Rouge | 0.9447 |
| Ascension | 2460600000 | Consumer & Commercial Solvents - Adhesives & Sealants | Population - Ascension | 1.6055 |
| East Baton Rouge | 2460600000 | Consumer & Commercial Solvents - Adhesives & Sealants | Population - East Baton Rouge | 0.9775 |
| Iberville | 2460600000 | Consumer & Commercial Solvents - Adhesives & Sealants | Population - Iberville | 0.8392 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| Livingston | 2460600000 | Consumer & Commercial Solvents - Adhesives & Sealants | Population - Livingston | 1.6621 |
| West Baton Rouge | 2460600000 | Consumer & Commercial Solvents - Adhesives & Sealants | Population - West Baton Rouge | 0.9447 |
| Ascension | 2460800000 | Consumer & Commercial Solvents - FIFRA Related Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2460800000 | Consumer & Commercial Solvents - FIFRA Related Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2460800000 | Consumer & Commercial Solvents - FIFRA Related Products | Population - Iberville | 0.8392 |
| Livingston | 2460800000 | Consumer & Commercial Solvents - FIFRA Related Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2460800000 | Consumer & Commercial Solvents - FIFRA Related Products | Population - West Baton Rouge | 0.9447 |
| Ascension | 2460900000 | Consumer & Commercial Solvents - Miscellaneous Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2460900000 | Consumer & Commercial Solvents - Miscellaneous Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2460900000 | Consumer & Commercial Solvents - Miscellaneous Products | Population - Iberville | 0.8392 |
| Livingston | 2460900000 | Consumer & Commercial Solvents - Miscellaneous Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2460900000 | Consumer & Commercial Solvents - Miscellaneous Products | Population - West Baton Rouge | 0.9447 |
| All | 2461021000 | Cutback Asphalt Application | Industrial - Other Petroleum | 1.0060 |
| All | 2461022000 | Emulsified Asphalt Application | Industrial - Other Petroleum | 1.0060 |
| Ascension | 2465000000 | Consumer Solvents - All Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2465000000 | Consumer Solvents - All Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2465000000 | Consumer Solvents - All Products | Population - Iberville | 0.8392 |
| Livingston | 2465000000 | Consumer Solvents - All Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2465000000 | Consumer Solvents - All Products | Population - West Baton Rouge | 0.9447 |
| Ascension | 2465100000 | Consumer Solvents - Personal Care Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2465100000 | Consumer Solvents - Personal Care Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2465100000 | Consumer Solvents - Personal Care Products | Population - Iberville | 0.8392 |
| Livingston | 2465100000 | Consumer Solvents - Personal Care Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2465100000 | Consumer Solvents - Personal Care Products | Population - West Baton Rouge | 0.9447 |
| Ascension | 2465200000 | Consumer Solvents - Household Care Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2465200000 | Consumer Solvents - Household Care Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2465200000 | Consumer Solvents - Household Care Products | Population - Iberville | 0.8392 |
| Livingston | 2465200000 | Consumer Solvents - Household Care Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2465200000 | Consumer Solvents - Household Care Products | Population - West Baton Rouge | 0.9447 |
| Ascension | 2465400000 | Consumer Solvents - Auto Aftermarket Products | Population - Ascension | 1.6055 |
| East Baton Rouge | 2465400000 | Consumer Solvents - Auto Aftermarket Products | Population - East Baton Rouge | 0.9775 |
| Iberville | 2465400000 | Consumer Solvents - Auto Aftermarket Products | Population - Iberville | 0.8392 |
| Livingston | 2465400000 | Consumer Solvents - Auto Aftermarket Products | Population - Livingston | 1.6621 |
| West Baton Rouge | 2465400000 | Consumer Solvents - Auto Aftermarket Products | Population - West Baton Rouge | 0.9447 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| Ascension | 2465800000 | Consumer Solvents - Pesticide Application | Population - Ascension | 1.6055 |
| East Baton Rouge | 2465800000 | Consumer Solvents - Pesticide Application | Population - East Baton Rouge | 0.9775 |
| Iberville | 2465800000 | Consumer Solvents - Pesticide Application | Population - Iberville | 0.8392 |
| Livingston | 2465800000 | Consumer Solvents - Pesticide Application | Population - Livingston | 1.6621 |
| West Baton Rouge | 2465800000 | Consumer Solvents - Pesticide Application | Population - West Baton Rouge | 0.9447 |
| All | 2501050120 | Petroleum & Petroleum Product Storage - Bulk Terminals | VMT - Total | 1.9671 |
| All | 2501055120 | Petroleum & Petroleum Product Storage - Bulk Plants | VMT - Total | 1.9671 |
| Ascension | 2501060052 | Gasoline Stations - Stage 1 - Splash Fill | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2501060052 | Gasoline Stations - Stage 1 - Splash Fill | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2501060052 | Gasoline Stations - Stage 1 - Splash Fill | VMT - Iberville | 1.5229 |
| Livingston | 2501060052 | Gasoline Stations - Stage 1 - Splash Fill | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2501060052 | Gasoline Stations - Stage 1 - Splash Fill | VMT - West Baton Rouge | 1.8135 |
| Ascension | 2501060053 | Gasoline Stations - Stage 1 - Balanced Submerged Fill | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2501060053 | Gasoline Stations - Stage 1 - Balanced Submerged Fill | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2501060053 | Gasoline Stations - Stage 1 - Balanced Submerged Fill | VMT - Iberville | 1.5229 |
| Livingston | 2501060053 | Gasoline Stations - Stage 1 - Balanced Submerged Fill | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2501060053 | Gasoline Stations - Stage 1 - Balanced Submerged Fill | VMT - West Baton Rouge | 1.8135 |
| Ascension | 2501060201 | Gasoline Stations - Underground Tank Breathing and Emptying | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2501060201 | Gasoline Stations - Underground Tank Breathing and Emptying | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2501060201 | Gasoline Stations - Underground Tank Breathing and Emptying | VMT - Iberville | 1.5229 |
| Livingston | 2501060201 | Gasoline Stations - Underground Tank Breathing and Emptying | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2501060201 | Gasoline Stations - Underground Tank Breathing and Emptying | VMT - West Baton Rouge | 1.8135 |
| All | 2501080050 | Petroleum & Petroleum Product Storage - Aviation Gasoline - Stage 1 | Transportation - Other Petroleum | 0.9778 |
| All | 2501080100 | Petroleum & Petroleum Product Storage - Aviation Gasoline - Stage 2 | Transportation - Other Petroleum | 0.9778 |
| Ascension | 2505000120 | Petroleum & Petroleum Product Transport - Gasoline - All Transport Types | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2505000120 | Petroleum & Petroleum Product Transport - Gasoline - All Transport Types | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2505000120 | Petroleum & Petroleum Product Transport - Gasoline - All Transport Types | VMT - Iberville | 1.5229 |
| Livingston | 2505000120 | Petroleum & Petroleum Product Transport - Gasoline - All Transport Types | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2505000120 | Petroleum & Petroleum Product Transport - Gasoline - All Transport Types | VMT - West Baton Rouge | 1.8135 |
| Ascension | 2505030120 | Petroleum & Petroleum Product Transport - Gasoline - Truck | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2505030120 | Petroleum & Petroleum Product Transport - Gasoline - Truck | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2505030120 | Petroleum & Petroleum Product Transport - Gasoline - Truck | VMT - Iberville | 1.5229 |
| Livingston | 2505030120 | Petroleum & Petroleum Product Transport - Gasoline - Truck | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2505030120 | Petroleum & Petroleum Product Transport - Gasoline - Truck | VMT - West Baton Rouge | 1.8135 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| Ascension | 2505040120 | Petroleum & Petroleum Product Transport - Gasoline - Pipeline | VMT - Ascension | 2.4560 |
| East Baton Rouge | 2505040120 | Petroleum & Petroleum Product Transport - Gasoline - Pipeline | VMT - East Baton Rouge | 1.7169 |
| Iberville | 2505040120 | Petroleum & Petroleum Product Transport - Gasoline - Pipeline | VMT - Iberville | 1.5229 |
| Livingston | 2505040120 | Petroleum & Petroleum Product Transport - Gasoline - Pipeline | VMT - Livingston | 2.5060 |
| West Baton Rouge | 2505040120 | Petroleum & Petroleum Product Transport - Gasoline - Pipeline | VMT - West Baton Rouge | 1.8135 |
| All | 2601000000 | On-site Incineration - Total | Unchanged | 1.0000 |
| All | 2601020000 | On-site Incineration - Commercial/Institutional | Unchanged | 1.0000 |
| Iberville | 2610000100 | Open Burning - Yard Waste - Leaves | Population - Iberville | 0.8392 |
| Livingston | 2610000100 | Open Burning - Yard Waste - Leaves | Population - Livingston | 1.6621 |
| West Baton Rouge | 2610000100 | Open Burning - Yard Waste - Leaves | Population - West Baton Rouge | 0.9447 |
| Iberville | 2610000400 | Open Burning - Yard Waste - Brush | Population - Iberville | 0.8392 |
| Livingston | 2610000400 | Open Burning - Yard Waste - Brush | Population - Livingston | 1.6621 |
| West Baton Rouge | 2610000400 | Open Burning - Yard Waste - Brush | Population - West Baton Rouge | 0.9447 |
| Iberville | 2610000500 | Open Burning - Land Clearing Debris | Population - Iberville | 0.8392 |
| Livingston | 2610000500 | Open Burning - Land Clearing Debris | Population - Livingston | 1.6621 |
| West Baton Rouge | 2610000500 | Open Burning - Land Clearing Debris | Population - West Baton Rouge | 0.9447 |
| Iberville | 2610030000 | Open Burning - Household Waste | Population - Iberville | 0.8392 |
| Livingston | 2610030000 | Open Burning - Household Waste | Population - Livingston | 1.6621 |
| West Baton Rouge | 2610030000 | Open Burning - Household Waste | Population - West Baton Rouge | 0.9447 |
| Ascension | 2630020000 | Wastewater Treatment - Public Owned | Population - Ascension | 1.6055 |
| East Baton Rouge | 2630020000 | Wastewater Treatment - Public Owned | Population - East Baton Rouge | 0.9775 |
| Iberville | 2630020000 | Wastewater Treatment - Public Owned | Population - Iberville | 0.8392 |
| Livingston | 2630020000 | Wastewater Treatment - Public Owned | Population - Livingston | 1.6621 |
| West Baton Rouge | 2630020000 | Wastewater Treatment - Public Owned | Population - West Baton Rouge | 0.9447 |
| All | 2701200000 | Biogenic - Vegetation - Total | Unchanged | 1.0000 |
| All | 2701220000 | Biogenic - Vegetation/Agriculture - Total | Unchanged | 1.0000 |
| All | 2801500170 | Agricultural Burning - Grasses | Unchanged | 1.0000 |
| All | 2801500181 | Agricultural Burning - Wild Hay | Unchanged | 1.0000 |
| All | 2801500250 | Agricultural Burning - Sugar Cane | Unchanged | 1.0000 |
| All | 2801500261 | Agricultural Burning - Wheat | Unchanged | 1.0000 |
| Ascension | 2810030000 | Structure Fires | Population - Ascension | 1.6055 |
| East Baton Rouge | 2810030000 | Structure Fires | Population - East Baton Rouge | 0.9775 |
| Iberville | 2810030000 | Structure Fires | Population - Iberville | 0.8392 |
| Livingston | 2810030000 | Structure Fires | Population - Livingston | 1.6621 |

| Parish | SCC | SCC Description | Projection Category | Projection Factor |
|---|---|---|---|---|
| West Baton Rouge | 2810030000 | Structure Fires | Population - West Baton Rouge | 0.9447 |
| Ascension | 2810060100 | Cremation | Population - Ascension | 1.6055 |
| East Baton Rouge | 2810060100 | Cremation | Population - East Baton Rouge | 0.9775 |
| Iberville | 2810060100 | Cremation | Population - Iberville | 0.8392 |
| Livingston | 2810060100 | Cremation | Population - Livingston | 1.6621 |
| West Baton Rouge | 2810060100 | Cremation | Population - West Baton Rouge | 0.9447 |

## APPENDIX G: POINT SOURCES SUBMITTING EIS

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 248 | Deltech Corp - Baton Rouge Facility |
| 285 | ExxonMobil Chemical Co - Baton Rouge Plastics Plant |
| 286 | ExxonMobil Baton Rouge Chemical Plant |
| 288 | Formosa Plastics Corp Louisiana |
| 289 | Honeywell International Inc - Baton Rouge Plant |
| 302 | TT Barge Services Mile 237 |
| 332 | ExxonMobil Corp - Baton Rouge Terminal #5005 |
| 529 | Univar USA - Geismar Facility |
| 582 | Plantation Pipe Line Co - Baton Rouge Breakout Tank Farm |
| 669 | Albemarle Corp - Process Development Center |
| 858 | ExxonMobil Refining & Supply Co - Anchorage Tank Farm |
| 1000 | Nexeo Solutions LLC |
| 1093 | Air Liquide Large Industries US LP - Geismar Utility Services |
| 1136 | Shell Chemical LP - Geismar Plant |
| 1138 | Westlake Vinyls Co LP |
| 1157 | Stupp Corp |
| 1186 | Entergy Gulf States LA LLC - Louisiana Station Electrical Generating Plant |
| 1306 | Cora-Texas Manufacturing Co LLC - White Castle Facility |
| 1314 | Eco Services Operations LLC - Sulfuric Acid Plant |
| 1395 | East West Copolymer LLC |
| 1396 | Baton Rouge Recycling Center |
| 1409 | The Dow Chemical Co - Louisiana Operations |
| 1413 | UOP LLC - Baton Rouge Plant |
| 1433 | Lion Copolymer Geismar LLC - Geismar Facility |
| 1468 | Rubicon LLC - Geismar Plant |
| 1516 | Clean Harbors Baton Rouge LLC |
| 1607 | TOTAL Petrochemicals & Refining USA Inc - COS-MAR Co |
| 1648 | BP Lubricants USA Inc - Port Allen Facility |
| 2043 | Boardwalk LA Midstream LLC - Choctaw Terminal |
| 2049 | BASF Corp - Geismar Site |
| 2082 | Honeywell International Inc - Geismar Plant |
| 2218 | Praxair Inc - Geismar Plant |
| 2245 | CF Industries Nitrogen LLC - Donaldsonville Nitrogen Complex |
| 2366 | Placid Refining Co LLC - Placid Refining Co |
| 2367 | Syngenta Crop Protection LLC - St Gabriel Plant |
| 2416 | CF Industries Nitrogen, LLC - Donaldsonville Nitrogen Complex |
| 2455 | Axiall LLC - Plaquemine Facility |
| 2617 | Georgia-Pacific Consumer Operations LLC - Port Hudson Operations |
| 2625 | Entergy Gulf States LA LLC - Willow Glen Plant |
| 2638 | ExxonMobil Baton Rouge Refinery |
| 2644 | Pioneer Americas LLC dba Olin Chlor Alkali Products - St Gabriel Facility |
| 2679 | Air Products & Chemicals Inc - Geismar 1 SMR Facility |
| 2937 | Shaw SSS Fabricators Inc - Addis Facility |

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 3085 | Ethyl Corp - Baton Rouge Plant |
| 3230 | ExxonMobil Chemical Co - Baton Rouge Resin Finishing Plant |
| 3263 | Taminco US Inc |
| 3302 | EnLink Processing Services LLC - Riverside Facility |
| 3387 | BASF Corp - Zachary Site |
| 3400 | Occidental Chemical Corporation - Geismar Plant |
| 3420 | Almatis Burnside Inc - Burnside Alumina Plant |
| 3492 | LBC Baton Rouge LLC - Sunshine Terminal |
| 3519 | ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant |
| 3587 | Nexeo Solutions LLC |
| 3732 | PCS Nitrogen Fertilizer LP - Geismar Agricultural Nitrogen & Phosphate Plant |
| 3991 | Genesis Crude Oil LP - Port Hudson Trucking Facility |
| 4174 | Sid Richardson Carbon Co - Addis Plant |
| 4197 | Southern Natural Gas Co - White Castle Compressor Station |
| 4407 | EBR City Parish - Renewable Energy Center |
| 4762 | Enterprise Gas Processing LLC - Tebone Fractionation Plant |
| 4803 | BFI Waste Systems of Louisiana LLC - Colonial Landfill |
| 4921 | Delta Petroleum Co Inc |
| 4990 | Lockhart Crossing CF #1 |
| 5176 | TOTAL Petrochemicals & Refining USA Inc-Carville Polystyrene Plant |
| 5190 | Quala Services LLC |
| 5540 | Louisiana State University - LSU |
| 5565 | Williams Olefins LLC - Geismar Ethylene Plant |
| 6858 | Griffin Industries LLC |
| 7359 | White Castle Compressor Station |
| 8007 | Florida Gas Transmission Co - Zachary Compressor Station #8 |
| 8055 | Louisiana Army National Guard - Gillis W Long Center |
| 8056 | Chem Carriers LLC - Plaquemine Point Shipyard |
| 8072 | Bayou Bouillon Production Facility |
| 8142 | Darrow Field Facility - Darrow Field |
| 9154 | CB&I Walker LA LLC |
| 9495 | BASF Corp - Port Allen Works |
| 11059 | Specialty Application Services Inc - Port Allen Facility |
| 11416 | Bridgeline Holdings LP - Sorrento Underground Gas Storage Facility |
| 11595 | Flowers Baking Co of Baton Rouge LLC - Baton Rouge Facility |
| 11767 | Waste Management of Louisiana LLC - Woodside Landfill & Recycling Center |
| 12096 | Westway Terminal Co LLC |
| 12680 | Troy Mfg (Texas) Inc |
| 14139 | Plains Marketing LP - St Gabriel Terminal |
| 14535 | Mexichem Fluor Inc - KLEA 134a Plant |
| 17042 | Lockhart Crossing Central Facility #3 |
| 17129 | Comite Field Facility |
| 17161 | Harvest Pipeline Co - Baton Rouge Gas Plant |
| 17383 | EnLink LIG LLC - Myrtle Grove Station |
| 17771 | T T Barge Cleaning Mile 183 Inc |
| 19184 | EnLink LIG Liquids LLC - Plaquemine Gas Plant |

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 19338 | Center Point Terminal Co LLC - Port Allen Terminal |
| 19556 | Intercontinental Terminals Company LLC - Anchorage Chemical Terminal |
| 19875 | Weyerhaeuser NR Co - Holden Wood Products |
| 20506 | Enterprise Products Operating LLC - Sorrento Products Handling Terminal |
| 22750 | EDO Specialty Plastics - Perkins Road Facility |
| 23773 | Nelson Service Co |
| 25344 | Criterion Catalysts & Technologies LP - Port Allen Plant |
| 25383 | Interstate Logos LLC dba Lamar Graphics |
| 26034 | Louisiana Energy & Power Authority (LEPA) - Plaquemine Steam Electric Power Plant |
| 26217 | Turner Industries Group LLC |
| 27495 | BCP Ingredients Inc |
| 27508 | CSI - Coatings Group - St Gabriel Facility |
| 27559 | Stupp Coatings LLC |
| 27834 | ExxonMobil Pipeline Co - Sorrento Storage Facility |
| 29884 | Oxbow Calcining LLC - Baton Rouge Calcined Coke Plant |
| 30073 | BASF Corp - DNT Plant |
| 31128 | East Baton Rouge Parish North Landfill |
| 31512 | Air Products & Chemicals Inc - Geismar 2 - Syngas Separation Unit |
| 31513 | Air Liquide Large Industries US LP - Geismar |
| 32045 | Manchac Point Oil & Gas Field Facility |
| 32056 | ExxonMobil Refining & Supply Co - Process Research Laboratories |
| 32135 | White Castle Field Production Facility |
| 32141 | Bridgeline Holdings LP - Tally Ho Compressor Station |
| 32145 | Northwest Bayou Choctaw Production Facility |
| 32151 | Schwing Production Facility |
| 32160 | Bayou Bleu Field Production Facility |
| 32161 | Bayou Henry Field Production Facility |
| 32465 | LVG WX1 RA SU LB Facility - Livingston Field |
| 32466 | Erva S Mayers # 1 |
| 33667 | Brock Services Ltd - Sandblast & Spray Paint Yard |
| 39633 | Command Services Inc |
| 39978 | Kinder Morgan Liquids Terminals St Gabriel LLC |
| 40037 | State Lease 14371 Production Facility |
| 40198 | Enterprise Products Operating LLC - Baton Rouge Fractionator & Propylene Concentrator Unit |
| 41417 | Enterprise Products Operating Co LLP- Dome Storage Facility |
| 43436 | Sullivan Equipment Co - Asphalt Plant #2 |
| 43634 | Trinity Marine Products Inc - Plant #48 |
| 46968 | Mid-America Resources Corp - Sorrento Field Production Facility |
| 51854 | Carville Energy LLC - Carville Energy Center |
| 67572 | E l Dupont de Nemours & Co Inc - Burnside Plant A H2SO4 Contact Facility |
| 80537 | Delta Environmental Division of Pentair Flow Technologies LLC |
| 83425 | Shintech Louisiana LLC - Addis Plant A |
| 83718 | Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant |
| 85393 | Bayou Henry Central Facility |
| 85899 | Industrial Coatings Contractors Inc - Geismar Paint & Blast Yard |

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 87501 | ExxonMobil Pipeline Co - West Bank Valve Site |
| 87956 | Dennis Stewart Equipment Rental Inc - Portable Concrete Crushing/Screening Unit |
| 88139 | Port Hudson Central Tank Battery |
| 88164 | Enterprise Products Operating LLC - Sorrento Loading Facility |
| 89237 | INEOS Oxide - A Division of INEOS Americas LLC |
| 89512 | Dugas & LeBlanc Ltd et al #1 Production Facility |
| 90176 | Genesis Crude Oil LP - Port Hudson Terminal |
| 92534 | Hexion Inc - Formaldehyde Plant |
| 95859 | University Field Production Facility |
| 96336 | US Composite Pipe South LLC - Baton Rouge Plant |
| 97675 | Athlon Solutions LLC |
| 98796 | ExxonMobil Pipeline Co - Anchorage Terminal |
| 100651 | Lone Star NGL Refinery Services LLC - Sorrento Gas Plant |
| 101588 | EEX Corp Production Facility #1 |
| 113166 | Bayou Bouillon Production Facility |
| 113313 | Destec Ventures Facility |
| 114658 | Siegen Production Facility - Siegen Field |
| 114659 | Woodside #1 Tank Battery - Port Hudson Field |
| 115181 | Weyerhaeuser #2 Production Facility |
| 118389 | Bayou Bleu Central Facility #1 |
| 119007 | Duplantier Tank Battery - University Field |
| 119008 | Nelson Tank Battery - University Field |
| 119219 | White Castle Deep Production Facility |
| 121482 | Associated Terminals of Baton Rouge LLC |
| 122402 | IMTT - Geismar |
| 122663 | Ann Fitz #2 Tank Battery - Port Hudson Field |
| 123784 | Wilbert E-1 Wellsite |
| 123785 | Wilbert B-3 Well Site |
| 125816 | Pennington #1 Tank Battery - SN 229775 Port Hudson Field |
| 126487 | Dent et al #1 Production Facility - Musson Field |
| 126578 | Shintech Louisiana LLC - Shintech Plaquemine Plant |
| 126748 | Schwing 10 Production Facility - Frog Lake Field |
| 128638 | Forest Home Partnership Facility |
| 129715 | EnLink LIG LLC - False River Station |
| 138716 | North Burtville Field Facility - North Burtville Field |
| 139063 | Oliver #1 Tank Battery - Profit Island Field |
| 140247 | Cooper Bayou Tank Battery - Port Hudson Field |
| 143779 | A Wilbert's Sons LLC 93 #1 Production Facility |
| 144826 | Crown Paper #1 Production Facility - Profit Island Field |
| 145270 | Sorrento Production Facility |
| 146741 | Lockhart Crossing EOR Facility |
| 146877 | Crown Paper #1 Treating Facility - Profit Island Field |
| 147113 | Delta Terminal Services LLC - Geismar Logistics Terminal |
| 150951 | Northwest Bayou Choctaw Sales Station |
| 152236 | Hoffman Heirs #1 - Sardine Point Field |
| 152431 | Mansfield Industrial Inc - Grosse Tete Facility |

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 152442 | Wilbert #4 Tank Battery - White Castle Field |
| 154867 | Air Products & Chemicals Inc - Baton Rouge Hydrogen Plant - Steam Methane Reforming Facility |
| 156077 | A Wilbert's Sons LLC 88 #2 Production Facility |
| 156867 | A Wilberts Son et al #1 Production Facility - White Castle Field |
| 158540 | REG Geismar LLC |
| 158722 | Lockhart Crossing Field Oil Loading Facility |
| 162612 | Southern Aggregates LLC - Plants 2 & 8 |
| 162653 | Cashio #2 Tank Battery - W Maringouin Field |
| 166443 | FloPam Inc - Flopam Facility |
| 168708 | Acme Brick #1 Production Facility |
| 170349 | Weyerhaeuser 18 #1 & 19 #1 Production Facility |
| 170748 | A Wilbert Sons 26 #1 Production Facility |
| 171765 | Plant Maintenance Services - PMS St Gabriel Plant |
| 173682 | AA Sulfuric Corp - Sulfuric Acid Plant |
| 175505 | DEXCO Polymers LP - Plaquemine Manufacturing Plant |
| 176031 | Bengas Midstream LLC - Iberville Sales Station |
| 176183 | Laurel Ridge Field Production Facility |
| 176441 | St Gabriel Tank Wash LLC |
| 176962 | Emerald Biofuels LLC |
| 178512 | St Gabriel Field |
| 179572 | Cetane Renewable Energy Products - Iberville |
| 179634 | LogiBio Louisiana LLC - Louisiana Transloading Facility |
| 180423 | Petrin Corp |
| 180463 | Southern Filter Media LLC |
| 181192 | Methanex USA LLC - Geismar Methanol Plant |
| 181441 | H H Gueymard #1 Production Facility - St Gabriel Field |
| 182797 | VUC Weyerhaeuser 9 #1 Production Facility - Bills Branch Field |
| 183703 | SE Tylose USA Inc & Its Affiliates - Plaquemine Plant |
| 184173 | Circle Graphics Inc |
| 184682 | Darrow South Facility |
| 184873 | EnLink Processing Services LLC - Plaquemine NGL Fractionation Plant |
| 184971 | Barber etal #1 Tank Battery - Comite Field |
| 185634 | LogiBio Louisiana LLC - Port Allen Terminal |
| 185924 | Kinder Morgan Liquid Terminals LLC - Geismar Methanol Terminal |
| 186554 | Genesis Rail Services LLC - Scenic Station |
| 187106 | Lorio RC SUA Wilbert Sons LLC |
| 187164 | Randolph Templet 001 |
| 187421 | DuPont 96-4 Production Facility |
| 187463 | Riverbank Investments #1 |
| 188321 | Wilberts 8-1 Production Facility |
| 188768 | C W Row III etal #6 Production Facility |
| 186450 | SL 20712 #1 Production Facility |
| 26324 | Louisiana Energy & Power Authority (LEPA) Plaquemine Diesel Power Plant |
| 117899 | Oil Well Harris 28-1 #1 |
| 33687 | Cooper T Smith Stevedoring Co - Terrence Derrick |

| AGENCY INTEREST NUMBER | FACILITY |
|---|---|
| 101098 | Booher Engineering Inc - Crown Z Facility |
| 188726 | Safway Group Holding LLC |
| 193924 | Solvay USA Inc - CathyVal Plant |
| 15346 | Marcello Distributors/Thibaut Oil Co Inc - Donaldsonville Facility |
| 187303 | WX RB SUB Starns 38 #1 Production Facility |

# APPENDIX H: RULES AND APPLICABILITY CHARTS

## SIP ASSOCIATED STATE RULES

### CHAPTER 21. CONTROL OF EMISSION OF ORGANIC COMPOUNDS

2101. Compliance Schedules
2103. Storage of Volatile Organic Compounds
2104. Crude Oil and Condensate
2107. Volatile Organic Compounds – Loading
2108. Marine Vapor Recovery
2109. Oil/Water – Separation
2111. Pumps and Compressors
2113. Housekeeping
2115. Waste Gas Disposal
2116. Glycol Dehydrators
2117. Exemptions
2119. Variances
2121. Fugitive Emission Control
2122. Fugitive Emission Control for Ozone Nonattainment Areas and Specified Parishes
2123. Organic Solvents
2125. Solvent Degreasers
2127. Cutback Paving Asphalt
2131. Filling of Gasoline Storage Vessels
2132. Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities
2133. Gasoline Bulk Plants
2135. Bulk Gasoline Terminals
2137. Gasoline Terminal Vapor – Tight Control Procedure
2139. Refinery Vacuum Producing Systems
2141. Refinery Process Unit Turnarounds
2143. Graphic Arts (Printing) by Rotogravure, Flexographic, Offset Lithographic, Letterpress, and Flexible Package Printing Processes
2145. Pharmaceutical Manufacturing Facilities
2147. Limiting VOC Emissions from SOCMI Reactor Process and Distillation Operations
2149. Limiting VOC Emissions from Batch Processing
2151. Limiting VOC Emissions from Cleanup Solvent Processing
2153. Limiting VOC Emissions from Industrial Wastewater

### CHAPTER 22. CONTROL OF EMISSIONS OF NITROGEN OXIDES (NOX)

2201. Affected Facilities in the Baton Rouge Nonattainment Area and the Region of Influence
2202. Contingency Plan

# APPLICABILITY CHARTS

| AI | | | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | FACILITY | PARISH | 2103 | 2104 | 2107 | 2108 | 2109 | 2111 | 2113 | 2115 | 2116 | 2121 | 2122 | 2123 | 2125 | 2131 | 2132 | 2133 | 2135 | 2137 | 2139 | 2141 | 2147 | 2149 | 2151 | 2153 | 2201 | 2202 |
| 6 | River Cement Sales Co - Burnside Facility | Ascension | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 248 | Deltech Corp - Baton Rouge Facility | East Baton Rouge | X | | | | | X | X | | | | X | | | | | | | | | | | | | | X | |
| 285 | ExxonMobil Chemical Co - Baton Rouge Plastics Plant | East Baton Rouge | X | | | | | X | X | X | | | X | | | | | | | | | | | | | | X | |
| 286 | ExxonMobil Baton Rouge Chemical Plant | East Baton Rouge | X | | X | | X | X | X | X | | | X | | | | | | | | | | X | X | X | X | X | |
| 288 | Formosa Plastics Corp Louisiana | East Baton Rouge | X | | X | | | X | X | X | | | X | | | | | | | | | | | | | | X | |
| 289 | Honeywell International Inc - Baton Rouge Plant | East Baton Rouge | X | | | | | | X | X | | | X | X | | | | | | | | | | X | | | X | |
| 302 | TT Barge Services Mile 237 | West Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 332 | ExxonMobil Corp - Baton Rouge Terminal #5005 | East Baton Rouge | X | | X | | X | X | X | | | | | | | | | | X | X | | | | | | | | |
| 529 | Univar USA - Geismar Facility | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 582 | Plantation Pipe Line Co - Baton Rouge Breakout Tank Farm | East Baton Rouge | X | | | | X | X | X | | | | | | | | | | | | | | | | | | | |
| 669 | Albemarle Corp - Process Development Center | East Baton Rouge | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 690 | Transport Service Co - Geismar Plant | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 858 | ExxonMobil Refining & Supply Co - Anchorage Tank Farm | West Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | X | | | |
| 1093 | Air Liquide Large Industries US LP - Geismar Utility Services | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 1136 | Shell Chemical LP - Geismar Plant | Ascension | X | | X | X | X | X | X | X | | | X | | | | | | | | | | X | X | | | X | |
| 1138 | Westlake Vinyls Co LP | Ascension | X | | | | | X | X | | | | X | | | | | | | | | | | | | X | X | |
| 1157 | Stupp Corp | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 1186 | Entergy Gulf States LA LLC - Louisiana Station Electrical Generating Plant | East Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | X | X |
| 1306 | Cora-Texas Manufacturing Co LLC - White Castle Facility | Iberville | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 1314 | Eco Services Operations LLC - Sulfuric Acid Plant | East Baton Rouge | X | | | | | X | X | X | | | X | | | | | | | | | | X | X | | X | | |
| 1395 | East West Copolymer LLC | East Baton Rouge | X | | | | | X | X | | | | X | | | | | | | | | | | | | | X | |
| 1396 | Baton Rouge Recycling Center | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 1409 | The Dow Chemical Co - Louisiana Operations | Iberville | X | | X | | X | X | X | X | | | X | X | X | | | | | | | | | X | X | X | X | |
| 1413 | UOP LLC - Baton Rouge Plant | East Baton Rouge | X | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1433 | Lion Copolymer Geismar LLC - Geismar Facility | Ascension | X | | | | | X | X | X | | | X | | | | X | | | | | | | | | | | |
| 1468 | Rubicon LLC - Geismar Plant | Ascension | X | | | | X | X | X | | | | X | | | | | | | | | | X | X | | | | |
| 1516 | Clean Harbors Baton Rouge LLC | East Baton Rouge | X | | | | | | | | | | | | | | | | | | | | | | | X | | |
| 1607 | TOTAL Petrochemicals & Refining USA Inc - COS-MAR Co | Iberville | X | | | | | | X | | | | X | | | | | | | | | | | | | | X | |
| 1648 | BP Lubricants USA Inc - Port Allen Facility | West Baton Rouge | X | | | | X | | X | | | | | | | | | | | | | | | | | | | |
| 1694 | Kleinpeter Farms Dairy LLC | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 1707 | Transport Service Co of Illinois | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2043 | Boardwalk Louisiana Midstream LLC - Choctaw Terminal | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 2049 | BASF Corp - Geismar Site | Ascension | X | | X | | | X | X | X | | | X | | | | | | | | | | | | | X | X | |
| 2082 | Honeywell International Inc - Geismar Plant | Ascension | X | | | | | | X | X | | | X | | | | | | | | | | | | | | X | |
| 2178 | Louisiana State University - Research & Development - Process Development Center | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2218 | Praxair Inc - Geismar Plant | Ascension | X | | | | | X | X | | | | X | | | | | | | | | | | | | | X | |
| 2300 | Adsorbent Solutions LLC - Adsorbent Solutions Carbon Reactivation Plant | Iberville | | | | | | | X | X | | | | | | | | | | | | | | | | | | |
| 2366 | Placid Refining Co LLC - Placid Refining Co | West Baton Rouge | X | | X | X | X | | X | X | | | X | | | | | | X | X | X | X | | | | | X | X |
| 2367 | Syngenta Crop Protection LLC - St Gabriel Plant | Iberville | X | | | | | X | X | X | | | | | | | | | | | | | | | | X | X | |
| 2416 | CF Industries Nitrogen, LLC - Donaldsonville Nitrogen Complex | Ascension | X | | | | | | X | X | | | | | | X | | | | | | | | | | | X | X |
| 2455 | Axiall LLC - Plaquemine Facility | Iberville | X | | X | | | X | X | X | | | X | | | | | | | | | | | | | | X | |
| 2617 | Georgia-Pacific Consumer Operations LLC - Port Hudson Operations | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 2625 | Entergy Gulf States LA LLC - Willow Glen Plant | Iberville | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 2638 | ExxonMobil Baton Rouge Refinery | East Baton Rouge | X | | | X | X | X | X | X | | | X | | | | X | | | | X | X | | | X | | X | X |
| 2644 | Pioneer Americas LLC dba Olin Chlor Alkali Products - St Gabriel Facility | Iberville | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 2679 | Air Products & Chemicals Inc - Geismar 1 SMR Facility | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 2937 | Shaw SSS Fabricators Inc - Addis Facility | West Baton Rouge | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 2964 | Delta Process Equipment Inc - Denham Springs Facility | Livingston | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 3085 | Ethyl Corp - Baton Rouge Plant | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 3230 | ExxonMobil Chemical Co - Baton Rouge Resin Finishing Plant | East Baton Rouge | X | | | | | X | X | X | | | | | | | | | | | | | | | X | | | |
| 3241 | ERGON - Baton Rouge Inc | East Baton Rouge | X | | | X | | | X | | | | | | | | | | | | | | | | | | | |
| 3263 | Taminco US Inc | Iberville | X | | X | | | X | X | | | | X | | | | | | | | | | X | | | | X | |
| 3302 | EnLink Processing Services LLC - Riverside Facility | Ascension | X | X | X | X | X | X | X | | | | X | | | | | | | | | | | | | | X | |
| 3387 | BASF Corp - Zachary Site | East Baton Rouge | X | | | | | X | X | | | | X | | | | | | | | | | | | | | | |
| 3400 | Occidental Chemical Corporation - Geismar Plant | Ascension | X | | X | | | X | X | X | | | | | | | | | | | | | | | | | X | |
| 3420 | Almatis Burnside Inc - Burnside Alumina Plant | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 3424 | Bercen Inc - A Division of Cranston Print Works | Livingston | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 3492 | LBC Baton Rouge LLC - Sunshine Terminal | Iberville | X | | X | X | | X | X | | | | | | | | | X | X | | | | | | | | | |
| 3519 | ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant | East Baton Rouge | X | | | | | X | X | X | | | X | | | | | | | | | | | | | | X | |

| AI NUMBER | FACILITY | PARISH | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2103 | 2104 | 2107 | 2108 | 2109 | 2111 | 2113 | 2115 | 2116 | 2121 | 2122 | 2123 | 2125 | 2131 | 2132 | 2133 | 2135 | 2137 | 2139 | 2141 | 2147 | 2149 | 2151 | 2153 | 2201 | 2202 |
| 3587 | Nexeo Solutions LLC | East Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 3732 | PCS Nitrogen Fertilizer LP - Geismar Agricultural Nitrogen & Phosphate Plant | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | X | |
| 3976 | Southern University A&M College - Baton Rouge Campus | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 3991 | Genesis Crude Oil LP - Port Hudson Trucking Facility | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 4174 | Sid Richardson Carbon Co - Addis Plant | West Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 4197 | Southern Natural Gas Co - White Castle Compressor Station | Iberville | X | | | | | X | X | | | | | | | | | | | | | | | | | | X | |
| 4407 | EBR City Parish - Renewable Energy Center | East Baton Rouge | | | | | | | X | X | | | | | | | | | | | | | | | | | | |
| 4762 | Enterprise Gas Processing LLC - Tebone Fractionation Plant | Ascension | X | | X | | | X | X | | X | | X | | | | | | | | | | | | | | | X |
| 4803 | BFI Waste Systems of Louisiana LLC - Colonial Landfill | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 4863 | M-I SWACO - Port Allen | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 4921 | Delta Petroleum Co Inc | Iberville | | | X | | | | X | | | | | | | | | | | | | | | | | | | |
| 4990 | Lockhart Crossing CF #1 | Livingston | X | | | | | X | X | | X | | X | | | | | | | | | | | | | | | |
| 5176 | TOTAL Petrochemicals & Refining USA Inc-Carville Polystyrene Plant | Iberville | X | | | | | X | X | | | | X | | | | | | | | | | | | | | X | |
| 5540 | Louisiana State University - LSU | East Baton Rouge | X | | | | | | X | | | | | | | X | | | | | | | | | | | X | |
| 5565 | Williams Olefins LLC - Geismar Ethylene Plant | Ascension | X | | | | | X | X | | | | | | | | | | | | | | | | | | X | |
| 6264 | Lhoist North America of Missouri Inc - Port Allen Terminal | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 6858 | Griffin Industries LLC | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 7359 | White Castle Compressor Station | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | X | |
| 8007 | Florida Gas Transmission Co - Zachary Compressor Station #8 | East Baton Rouge | | | X | | | X | X | | | | | | | | | | | | | | | | | | X | |
| 8008 | R J Daigle & Sons Contractors Inc - Central Asphalt Plant | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 8055 | Louisiana Army National Guard - Gillis W Long Center | Iberville | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 8056 | Chem Carriers LLC - Plaquemine Point Shipyard | Iberville | X | | | | | X | X | | | | | X | | | | | | | | | | | | | | |
| 8072 | Bayou Bouillon Production Facility | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 8142 | Darrow Field Facility - Darrow Field | Ascension | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 9154 | CB&I Walker LA LLC | Livingston | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 9503 | Community Coffee Co LLC - Port Allen Plant | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 11059 | Specialty Application Services Inc - Port Allen Facility | West Baton Rouge | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 11416 | Bridgeline Holdings LP - Sorrento Underground Gas Storage Facility | Ascension | X | | | | | X | X | | X | | | | | | | | | | | | | | | | X | X |
| 11566 | Carmeuse Lime & Stone Inc - Pelican Operation | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11595 | Flowers Baking Co of Baton Rouge LLC - Baton Rouge Facility | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 11767 | Waste Management of Louisiana LLC - Woodside Landfill & Recycling Center | Livingston | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 12096 | Westway Terminal Co LLC | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 12680 | Troy Mfg (Texas) Inc | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 13724 | NALCO Company | West Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 14067 | Qualawash Holdings LLC | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 14139 | Plains Marketing LP - St Gabriel Terminal | Iberville | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 14535 | Mexichem Fluor Inc - KLEA 134a Plant | Iberville | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 17042 | Lockhart Crossing Central Facility #3 | Livingston | | X | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 17129 | Comite Field Facility | East Baton Rouge | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 17383 | EnLink LIG LLC - Myrtle Grove Station | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | X | X |
| 17771 | T T Barge Cleaning Mile 183 Inc | Ascension | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 18202 | ExxonMobil Corp | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 19184 | EnLink LIG Liquids LLC - Plaquemine Gas Plant | Iberville | X | | X | | | | X | X | X | | X | | | | | | | | | | | | | | | |
| 19338 | Center Point Terminal Co LLC - Port Allen Terminal | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 19556 | Intercontinental Terminals Company LLC - Anchorage Chemical Terminal | West Baton Rouge | | | X | X | | X | X | | | | | | | | | | | | | | | | | | | |
| 19875 | Weyerhaeuser NR Co - Holden Wood Products | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 19884 | LD Commodities Port Allen Export Elevator LLC | West Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 20411 | Bayou Bleu Central Facility #2 | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 20506 | Enterprise Products Operating LLC - Sorrento Products Handling Terminal | Ascension | | | X | | | | X | | | | | | | | | | | | | | | | | | | |
| 22750 | EDO Specialty Plastics - Perkins Road Facility | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 23162 | Holcim US Inc | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23773 | Nelson Service Co | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 23946 | Bayou Railcar Services Inc | Livingston | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25186 | CMC Construction Services - Concrete Accessories | East Baton Rouge | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 25344 | Criterion Catalysts & Technologies LP - Port Allen Plant | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 25383 | Interstate Logos LLC dba Lamar Graphics | East Baton Rouge | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 25891 | Motiva Enterprises LLC - Sorrento Off Site Storage Caverns Facility | Ascension | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26034 | Louisiana Energy & Power Authority (LEPA) - Plaquemine Steam Electric Power Plant | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 26217 | Turner Industries Group LLC | West Baton Rouge | | | | | | | X | | | | | X | | | | | | | | | | | | | | |

| AI | | | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
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| NUMBER | FACILITY | PARISH | 2103 | 2104 | 2107 | 2108 | 2109 | 2111 | 2113 | 2115 | 2116 | 2121 | 2122 | 2123 | 2125 | 2131 | 2132 | 2133 | 2135 | 2137 | 2139 | 2141 | 2147 | 2149 | 2151 | 2153 | 2201 | 2202 |
| 26272 | Trimac Transportation Inc | Ascension | X | | | | X | | X | | | | | | | | | | | | | | | | | | | |
| 26324 | Louisiana Energy & Power Authority (LEPA) Plaquemine Diesel Power Plant | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 26345 | HCM Louisiana LLC - Southland Block | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26984 | Nachurs Alpine Solutions Corp | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 27495 | BCP Ingredients Inc | Iberville | | | X | | | X | X | | | | | | | | | | | | | | | | | | | |
| 27508 | CSI - Coatings Group - St Gabriel Facility | Iberville | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 27559 | Stupp Coatings LLC | East Baton Rouge | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 27823 | Air Liquide Large Industries US LP - Plaquemine Facility | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 27834 | ExxonMobil Pipeline Co - Sorrento Storage Facility | Ascension | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 29881 | The Scotts Co LLC  - Hyponex Geismar Facility | Ascension | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29884 | Oxbow Calcining LLC - Baton Rouge Calcined Coke Plant | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 30073 | BASF Corp - DNT Plant | Ascension | X | | | | | X | X | X | | | X | | | | | | | | | | | | | | | |
| 31128 | East Baton Rouge Parish North Landfill | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 31512 | Air Products & Chemicals Inc - Geismar 2 - Syngas Separation Unit | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 31513 | Air Liquide Large Industries US LP - Geismar | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 32042 | Shell Pipeline Co LP - Equilon Plantation Terminal Station | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 32045 | Manchac Point Oil & Gas Field Facility | East Baton Rouge | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 32135 | White Castle Field Production Facility | Iberville | | | | | | X | X | | X | | | | | | | | | | | | | | | | X | |
| 32140 | Klondike Field | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 32145 | Northwest Bayou Choctaw Production Facility | Iberville | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 32151 | Schwing Production Facility | Iberville | X | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 32156 | Kaneb Pipe Line Operating Partnership LP - White Castle Ammonia Pump Station | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 32157 | NuStar Pipeline Operating Partnership LP - Ramah Ammonia Pump Station | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 32160 | Bayou Bleu Field Production Facility | Iberville | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 32465 | LVG WX1 RA SU LB Facility - Livingston Field | Livingston | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 32467 | Evergreen Memorial | Livingston | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33531 | Coastal Bridge Co LLC - Port Allen Asphalt Plant | West Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33564 | Cooper T Smith Stevedoring Co - America Weigh Rig Loading & Transfer Facility | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 39633 | Command Services Inc | Iberville | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 39945 | Impala Warehousing (US) LLC - Burnside Terminal | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 39978 | Kinder Morgan Liquids Terminals St Gabriel LLC | Iberville | X | | X | X | | X | X | | | | | | | | | | | | | | | | | | | |
| 40037 | State Lease 14371 Production Facility | Iberville | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 40198 | Enterprise Products Operating LLC - Baton Rouge Fractionator & Propylene Concentrator Unit | West Baton Rouge | | | | | | X | X | X | | | X | | | | | | | | | | | | | | | |
| 41417 | Enterprise Products Operating Co LLP- Dome Storage Facility | Ascension | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 42414 | MINTEQ International Inc - Baton Rouge Facility | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 43303 | Southern Ionics Inc | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 43436 | Sullivan Equipment Co - Asphalt Plant #2 | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 43599 | Sunbelt Chemicals Corp | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 43634 | Trinity Marine Products Inc - Plant #48 | West Baton Rouge | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 46968 | Sorrento Field Production Facility | Ascension | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 51854 | Carville Energy LLC - Carville Energy Center | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 67572 | E I Dupont de Nemours & Co Inc - Burnside Plant A H2SO4 Contact Facility | Ascension | X | | X | | | | X | | | | | | | | | | | | | | | | | | | |
| 80537 | Delta Environmental Division of Pentair Flow Technologies LLC | Livingston | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 81855 | Riverland Industries Inc | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 83425 | Shintech Louisiana LLC - Addis Plant A | West Baton Rouge | X | | | | | | X | | | | X | | | | | | | | | | | | | | X | |
| 83718 | Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant | Ascension | X | | X | | | X | X | X | | | X | | | | | | | | | | | | | | | |
| 84377 | Bayou Des Glaises Field Production Facility - Wilbert Mineral B Lease | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 85393 | Bayou Henry Central Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 85899 | Industrial Coatings Contractors Inc - Geismar Paint & Blast Yard | Ascension | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 87501 | ExxonMobil Pipeline Co - West Bank Valve Site | West Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 87956 | Dennis Stewart Equipment Rental Inc - Portable Concrete Crushing/Screening Unit | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 88139 | Port Hudson Central Tank Battery | East Baton Rouge | | X | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 88164 | Enterprise Products Operating LLC - Sorrento Loading Facility | Ascension | | | X | | | | X | | | | | | | | | | | | | | | | | | | |
| 89237 | INEOS Oxide - A Division of INEOS Americas LLC | Iberville | X | | | | | X | X | | | | X | | | | | | | | | | X | X | | X | | |
| 89277 | Univar USA Inc - Geismar Terminal | Ascension | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 89512 | Dugas & LeBlanc Ltd et al #1 Production Facility | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 89982 | American Pride Fabricators LLC | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90176 | Genesis Crude Oil LP - Port Hudson Terminal | East Baton Rouge | X | | | X | | X | X | | | | | | | | | | | | | | | | | | | |
| 90295 | Cooper/ T Smith Stevedoring Co Inc - Babe Derrick Barge | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |

| AI | | | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
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| NUMBER | FACILITY | PARISH | 2103 | 2104 | 2107 | 2108 | 2109 | 2111 | 2113 | 2115 | 2116 | 2121 | 2122 | 2123 | 2125 | 2131 | 2132 | 2133 | 2135 | 2137 | 2139 | 2141 | 2147 | 2149 | 2151 | 2153 | 2201 | 2202 |
| 92534 | Hexion Inc - Formaldehyde Plant | Ascension | X | | | | | X | X | | | | X | | | | | | | | | | | | | | | |
| 95770 | Ascension Ready Mix Inc - Choctaw Plant | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96336 | US Composite Pipe South LLC - Baton Rouge Plant | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 97675 | Athlon Solutions LLC | Ascension | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 97908 | ExxonMobil Pipeline Co - Plastic Plant Meter Site | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 98796 | ExxonMobil Pipeline Co - Anchorage Terminal | West Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 99355 | Atlantic Southeast Airlines Inc - ASA Inc - Baton Rouge Station | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 100581 | Williams Olefins LLC - Hydrocarbon Barge Loading - Honeywell Dock | Ascension | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 101588 | EEX Corp Production Facility #1 | Iberville | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 102971 | Turner Specialty Services LLC - TIS 415 Yard | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 113166 | Bayou Bouillon Production Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 113313 | Destec Ventures Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 114658 | Siegen Production Facility - Siegen Field | East Baton Rouge | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 114659 | Woodside #1 Tank Battery - Port Hudson Field | East Baton Rouge | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 115181 | Weyerhaeuser #2 Production Facility | Livingston | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 115789 | Air Liquide America US LP - Air Liquide America LP Facility | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 118389 | Bayou Bleu Central Facility #1 | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 119007 | Duplantier Tank Battery - University Field | East Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 119008 | Nelson Tank Battery - University Field | East Baton Rouge | X | X | X | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 119219 | White Castle Deep Production Facility | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 121482 | Associated Terminals of Baton Rouge LLC | West Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 122402 | IMTT - Geismar | Ascension | X | | X | | | | X | | | | | | | | | | | | | | | | | | | |
| 122663 | Ann Fitz #2 Tank Battery - Port Hudson Field | East Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 123784 | Wilbert E-1 Wellsite | Iberville | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 123785 | Wilbert B-3 Well Site | Iberville | X | X | X | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| 124129 | R Lip LLC - Tristar Woodwaste Processing Facility | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 124274 | Rust Buster's Facility | West Baton Rouge | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 124995 | ABB DE Inc | Ascension | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 125816 | Pennington #1 Tank Battery - SN 229775 Port Hudson Field | East Baton Rouge | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 126487 | Dent et al #1 Production Facility - Musson Field | Iberville | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 126578 | Shintech Louisiana LLC - Shintech Plaquemine Plant | Iberville | X | | X | X | | X | X | X | | | | | | | | | | | | | | | | X | X | |
| 126748 | Schwing 10 Production Facility - Frog Lake Field | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 128638 | Forest Home Partnership Facility | Iberville | | X | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 129715 | EnLink LIG LLC - False River Station | West Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 130220 | Resthaven Gardens of Memory Cemetery & Funeral Home | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 130816 | Kanorado Terminals Corp - Baton Rouge Facility | East Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 134725 | Northwest Bayou Choctaw SWD Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 138716 | North Burtville Field Facility - North Burtville Field | East Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 140247 | Cooper Bayou Tank Battery - Port Hudson Field | East Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 143779 | A Wilbert's Sons LLC 93 #1 Production Facility | West Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 144826 | Crown Paper #1 Production Facility - Profit Island Field | East Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 145270 | Sorrento Production Facility | Ascension | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 146741 | Lockhart Crossing EOR Facility | Livingston | | X | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 146877 | Crown Paper #1 Treating Facility - Profit Island Field | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 147113 | Delta Terminal Services LLC - Geismar Logistics Terminal | Ascension | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 147121 | Turner Specialty Services LLC - Module Fabrication Facility | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 147402 | USALCO Port Allen Plant LLC | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 150240 | Coca-Cola Bottling Co United Inc | East Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 150951 | Northwest Bayou Choctaw Sales Station | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 151945 | Angelle Concrete Group LLC - Westport Plant | West Baton Rouge | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 152236 | Hoffman Heirs #1 - Sardine Point Field | East Baton Rouge | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 152431 | Mansfield Industrial Inc - Grosse Tete Facility | Iberville | | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 153296 | Marathon Pipe Line LLC - Plantation Storage Facility | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 154058 | Kaneb Pipe Line Operating Partnership LP - Plaquemine Delivery Site | Iberville | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 154502 | Gator Environmental Waste Solutions LLC - Gator Type III C&D Debris Landfill | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 154867 | Air Products & Chemicals Inc - Baton Rouge Hydrogen Plant | East Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 155459 | Southern Ionics Inc - Baton Rouge North | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 156077 | A Wilbert's Sons LLC 88 #2 Production Facility | West Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 156867 | A Wilberts Son et al #1 Production Facility - White Castle Field | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |

| AI | | | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | FACILITY | PARISH | 2103 | 2104 | 2107 | 2108 | 2109 | 2111 | 2113 | 2115 | 2116 | 2121 | 2122 | 2123 | 2125 | 2131 | 2132 | 2133 | 2135 | 2137 | 2139 | 2141 | 2147 | 2149 | 2151 | 2153 | 2201 | 2202 |
| 157056 | Cavern Well #25 Compressor Station | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 158540 | REG Geismar LLC | Ascension | X | | X | | | | X | X | | | | | | | | | | | | | | | | | | |
| 158722 | Lockhart Crossing Field Oil Loading Facility | Livingston | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 161805 | Boardwalk Storage Co LLC - Florida Gas Meter Station | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 162612 | Southern Aggregates LLC - Plants 2 & 8 | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 162653 | Cashio #2 Tank Battery - W Maringouin Field | Iberville | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165288 | ICI Process Technologies LLC - ICI Process Technologies Port Allen Facility | West Baton Rouge | X | | | | X | X | X | | | | X | | | | | | | | | | | | | | | |
| 166443 | FloPam Inc - Flopam Facility | Iberville | X | | | | | X | X | | | | | | X | | X | | | | | | | | | | | |
| 168708 | Acme Brick #1 Production Facility | East Baton Rouge | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 170349 | Weyerhaeuser 18 #1 & 19 #1 Production Facility | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 170748 | A Wilbert Sons 26 #1 Production Facility | West Baton Rouge | | | | | | X | X | | X | | | | | | | | | | | | | | | | | |
| 171765 | Plant Maintenance Services - PMS St Gabriel Plant | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 171846 | Industrial Coatings Production Facility - Darrow Field | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 172468 | Great Southern Galvanizing Inc - Great States Galvanizing | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 173682 | AA Sulfuric Corp - Sulfuric Acid Plant | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 174213 | Gilchrist Construction Co LLC - Asphalt Plant #2 | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 175505 | DEXCO Polymers LP - Plaquemine Manufacturing Plant | Iberville | X | | | | | X | X | | | | | | | | | | | | | | | | | X | | |
| 176031 | Bengas Midstream LLC - Iberville Sales Station | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 176183 | Laurel Ridge Field Production Facility | Iberville | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 176441 | St Gabriel Tank Wash LLC | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 178512 | St Gabriel Field | Iberville | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 179634 | LogiBio Louisiana LLC - Louisiana Transloading Facility | West Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 180423 | Petrin Corp | West Baton Rouge | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 180463 | Southern Filter Media LLC | East Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 180668 | Southern Aggregates LLC - Hood Plant | Livingston | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 181192 | Methanex USA LLC - Geismar Methanol Plant | Ascension | X | | | | | X | X | | | | X | | | | | | | | | | | | | | | |
| 181441 | H H Gueymard #1 Production Facility - St Gabriel Field | Iberville | X | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 182567 | DEXCO Polymers LP - Research & Development Facility | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 182797 | VUC Weyerhaeuser 9 #1 Production Facility - Bills Branch Field | Livingston | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 183703 | SE Tylose USA Inc & Its Affilates - Plaquemine Plant | Iberville | X | | | | | X | X | | | X | | | | | | | | | | | | | | | | |
| 184173 | Circle Graphics Inc | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 184682 | Darrow South Facility | Ascension | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 184873 | EnLink Processing Services LLC - Plaquemine NGL Fractionation Plant | Iberville | | X | | | | X | X | X | | | X | | | | | | | | | | | | | | X | |
| 185634 | LogiBio Louisiana LLC - Port Allen Terminal | West Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 185924 | Kinder Morgan Liquid Terminals LLC - Geismar Methanol Terminal | Ascension | X | | X | X | | X | X | | | | | | | | | | | | | | | | | | | |
| 186450 | SL 20712 #1 Production Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 186554 | Genesis Rail Services LLC - Scenic Station | East Baton Rouge | X | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 186785 | Baton Rouge Transit LLC - Baton Rouge Transit | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 187106 | Lorio RC SUA Wilbert Sons LLC | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 187164 | Randolph Templet 001 | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 187303 | WX RB SUB Starns 38 #1 Production Facility | Livingston | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 187421 | DuPont 96-4 Production Facility | West Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 187463 | Riverbank Investments #1 | East Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 188321 | Wilberts 8-1 Production Facility | West Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 188726 | Safway Group Holding LLC | Ascension | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 188768 | C W Row III etal #6 Production Facility | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 189291 | Forest Home Facility - Whitecastle Field | Iberville | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 189445 | Gueymard A-1 Production Facility | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 190229 | NFR BioEnergy CT LLC - NFR BioEnergy CT | Iberville | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 190267 | Belle Grove #1 Facility | Iberville | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 190482 | E B Adams #1 Tank Battery - White Castle Field | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 190953 | Chevron Midstream Pipelines LLC - Sorrento TENDS Pumping Station | Ascension | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 191279 | Farewell #5-Alt Production Facility - False River Field | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 191451 | BR Port Services LLC - Baton Rouge Terminal | West Baton Rouge | X | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 191612 | LSU Board of Supervisors #1 Production Facility - University Field | East Baton Rouge | | | | | | | X | | X | | | | | | | | | | | | | | | | | |
| 191840 | BR Port Services LLC - Baton Rouge Terminal Dock | West Baton Rouge | | | | X | | X | X | | | | | | | | | | | | | | | | | | | |
| 193924 | Solvay USA Inc - CathyVal Plant | East Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 194474 | PerformanX Specialty Chemicals - St. Gabriel Operations | Iberville | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 194852 | John Evans etal #1 Production Facility - Laurel Ridge Field | Iberville | X | | | | | X | X | | X | | | | | | | | | | | | | | | | | |

| AI | | | LAC 33:III. Chapter 21 | | | | | | | | | | | | | | | | | | | | | | | | LAC 33:III. Chapter 22 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| 194969 | Ann Fitz #3 Tank Battery - Port Hudson Field | East Baton Rouge | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 195308 | MAACO Collision & Auto Repair | Ascension | X | | | | | | X | | | | | X | | | | | | | | | | | | | | |
| 195357 | Marlborough Oil & Gas LLC #1 Tank Battery - Bayou Choctaw Field | West Baton Rouge | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 195578 | Wilbert Mineral Corp #93 Wellsite Facility - Bayou Choctaw Field | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 195579 | Wilbert Mineral Corp #84 Wellsite Facility - Bayou Choctaw Field | Iberville | | | | | | X | X | | | | | | | | | | | | | | | | | | | |
| 195580 | Bayou Choctaw Field Central Tank Battery | Iberville | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |
| 195964 | Port Allen Land LLC | West Baton Rouge | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| 196426 | Hutchinson #1 Production Facility | Livingston | X | X | | X | | X | X | X | X | | | | | | | | | | | | | | | | X | |